STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
Honolulu, Hawaii

File No.: ENF HA-06-40

March 10, 2006

Board of Land and
Natural Resources
State of Hawaii
Honolulu, Hawaii

REGARDING:	Enforcement File No. HA-06-40 Regarding Alleged Unauthorized Land Uses found at the Mauna Loa Observatory
BY:	United State (U.S.), Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), Observatory and Global Network Operations, NOAA/Earth System Research Laboratory (ESRL), Global Monitoring Division (GMD), 325 Broadway R/GMD1, Boulder, Colorado, 80305
LAND OWNERSHIP:	State Department of Land and Natural Resources
TMK:	(3) 4-4-016:009 (3) 4-4-016:011
AREA OF PARCEL:	Each TMK 4.05 Acres
AREA OF USE:	Total 8.10 Acres
LOCATION:	Mauna Loa, Hamakua District, Island of Hawaii
SUBZONE:	Resource

HISTORY OF SUBJECT PARCEL & PRIOR CONSERVATION DISTRICT USE APPLICATION:

On January 28, 1956, the U.S. DOC, NOAA Weather Bureau Station received use of a 4.05-acre area located on Mauna Loa to establish the Mauna Loa Observatory (MLO) under Executive Order (E.O.) 1720; the resulting parcel became TMK: (3) 4-4-016:009 (**Exhibit 1**).

On October 16, 1992, Conservation District Use Application (CDUA) HA-2556[1] was approved by the Board of Land and Natural Resources (Board) to subdivide an 100,221.081-acre parcel of the Mauna Loa Forest and Game Reserve (Subject Parcel TMK: (3) 4-4-016:001) and to construct an 8,500 square foot Climatological/Atmospheric Research Center building (known today as the Network for the Detection of Stratospheric Change building (NDSC). The resulting parcel became TMK: (3) 4-4-016:011 under an Executive Order 3646 (**Exhibit 2**).

DESCRIPTION OF AREA:

TMK's: (3) 4-4-016:011 and 009 comprise an 8.10 acre area. The site is located on the slope of Mauna Loa Mountain, Hamakua District, Island of Hawaii. Mauna Loa is the largest volcano on the planet, and is one of the most active. MLO is located approximately 3 miles from the summit's crater, Mokuaweoweo, which is 13,680 feet (4,170 meters) above sea level. Mauna Loa has erupted 39 times; its last eruption was in 1984. The subject parcel is located in the State Land Use (SLU) Conservation District, Resource subzone (**Exhibit 3**).

Currently known as the Mauna Loa Climatological and Atmospheric Research Observation Site or MLO, the site is under NOAA's Global Monitoring Division (GMD). MLO is one of five baseline observatories[2] from which numerous in situ and remote atmospheric and solar measurements are conducted. The observatory measures carbon dioxide, carbon monoxide, methane, nitrous oxide, surface and stratospheric ozone, halogenated compounds including CFC replacements, hydrocarbons, sulfur gases, aerosols, and solar and infrared radiation. The observatory data is used to assess climate forcing, ozone depletion and baseline air quality, to develop and test diagnostic and predictive models, and to keep the public, policy makers, and scientists abreast of the current state of our chemical and radiative atmosphere.

NOAA's three guiding principles are: 1) to conduct high quality and cutting edge science projects over minimum time scales (not less than 5 years); 2) to operate an absolute safe facility; and 3): to operate a secure facility to protect the taxpayers dollars invested in MLO, and the personnel working there.

ALLEGED UNAUTHORIZED LAND USES:

On September 21, 2004, the Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL) conducted a site inspection of the MLO. During the inspection it was noted various facilities were under construction. Some of the buildings inspected and photographed at the MLO are shown as **Exhibit 4**.

On November 21, 2005, OCCL staff again conducted a site inspection of the MLO. **Exhibit 5** photographs show other buildings that were inspected and photographed, and the AMIBA site.

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1 CDUA HA-2556 was subject to fifteen terms and conditions.

2 The five sites are located in Barrow, Alaska; Trinidad Head, California; Mauna Loa, Hawaii; Samoa; and the South Pole.

On December 16, 2005, the OCCL sent a letter to NOAA Director, Dr. Russ Schnell and asked him for information regarding the land uses occurring on TMK's: 009 and 011. The OCCL noted there was no information on the land uses, and asked NOAA to identify all the structure(s), their purpose, and the date their construction[3] **(Exhibit 6)**.

On January 10, 2006, the OCCL sent another letter to NOAA requesting information on all land uses, whether located on land under E.O. 3646 or E.O. 1720. The following information was requested: 1) structures constructed before 1964 that have not been expanded, and/or remodeled; 2) structures constructed before 1964 (that have been expanded, and/or remodeled; 3) all structures constructed after 1964; 4) to summarize the square footage of the structure(s) area; and 5) the purpose of each structure (whether the structure is for astronomy or weather related - meteorlogical/climatological). A detailed map was requested with labels and dates of each structure **(Exhibit 7)**.

On February 20, 2006, NOAA replied with a description of the structures: 1) constructed before 1964 and unaltered to date; 2) constructed before 1964 but remodeled, relocated or modified after 1964; 2) constructed after 1964; 3) square footages; 4) purpose of each structure; and 5) a location map **(Exhibit 8)**.

Section A. Construction Prior to 1964 and Unaltered to Date:

- Approximately late 1950's slab of concrete with pipe between Army radio tower and AEC building (approximately 30 square feet);
- 1956 Old CO2 tower (approximately 9 square feet);
- 1956 EPA Tower -
    - EPA instruments were installed on this same tower in 2001;
    - (total square footage 170.12);
- 1956 Storage shed (approximately 246 square feet);
- 1956 Outdoor toilets (approximately 32.8 square feet);
- 1956 Low meteorological tower (approximately 4 square feet);
- 1957 Solar Radiation Wall -
    - 1983 UC Davis Samplers mounted on wall (approximately 42 square feet);
- 1957 Rain Collector GMD & EPA (approximately 5.5 square foot);
- 1958 Butler Building (approximately 252 square feet);
- 1959 Radon/SO_2 building -
    - instruments later installed to measure radon and SO_2;
    - (total square footage 258.4 square feet);

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3 Information was requested on: AMIBA building and accessory structures, USGS Tilt & Strain and Well structures, wind sock, GONG, University of Massachusetts Microwave Ozone NRL Water Vapor; Groundwinds, Keck 1 and 2 structure, Army Radio Building, Army Communications Tower, AEC Building, Keeling Building, Butler Building, AMIBA staff building, Communication Structures, Power Structures, Task and Flask Storage, Storage Shed, Low Metereological Tower, 120 foot Tower, Rain Gauges, UNM Sampler, UC Davis Samplers, NASA Sunphotometers, Solar Radiation Wall, Rain Collector, Webmet Area, "Allsky Area," NCAR High Altitude Observatory (Mauna Loa Solar Observatory), Radon/SO2 Building, FSL/GPS Antenna, Solar Radiation Deck, UH VYSOS Building, University of Denver FTIR, Solar Dome, Dobson Dome, and EPA Tower.

- *Early 1960's concrete pads. One slab is located near the generator building (approximately 128.25 square feet). Slab near former DOE tower (approximately 18 square feet);*
- 1960 NASA Sunphotometers (approximately 168 square feet);
- 1961 Solar Dome (approximately 287.28 square feet);
- 1963 AEC Building (approximately 416 square feet); and
- 1963 shop (approximately 284.9 square feet).

Section B. Constructed Before 1964 but Remodeled, Relocated or Modified after 1964:

- 120 foot Meteorological Tower -
  - 1958 original 90 foot tower;
  - 1986 replaced by taller tower (base approximately 48 square feet);
- Keeling Building -
  - 1956 original Mauna Loa building;
  - 1960 added water tank room - south west corner;
  - 1964 added storage space - under walk-up deck;
  - 1994 added Flask storage room - north west corner;
  - (approximately total square footage 1,379.96);
- Rain Gauges -
  - 1956 original construction;
  - 1984 upgraded (approximately 9 square feet);
- Dobson Dome shelter -
  - 1957 first shelter;
  - 1973 newer dome cover installed (approximately 132 square feet);
- Army Radio Transmitter Building -
  - 1963 original structure;
  - 2005 replaced with shipping container structure (approximately 173.81 square feet);
- Army Communications Tower -
  - 1963 original military radio installation and antennae;
  - 2001 upgraded tower service (approximately 179.607 square feet);
- NCAR High Altitude Observatory -
  - 1964 constructed;
  - 1965 instruments installed in 1965;
  - 1991 upgraded (approximately 770.8 square feet);
- Communications Structures -
  - 1962 original wooden building constructed;
  - early 1980's replaced concrete building for telephone communications (128.8 square feet);
- GPS Antenna -
  - 1960 pole mount;
  - 2003 Antenna installed in 2003;

- USGS Tilt & Strain Well structures -
  - 1963 original lava/earthquake detector;
  - 2000 replaced by a sensor on land located under E.O. 3646 (approximately 15 square feet);
- Wind sock -
  - 1960 original pole on land located under E.O. 3646;
  - cloth wind sock is replaced every 10 years (approximately 25 square feet);

Section C. Constructed After 1964:

- Old unused 16 foot tall communication tower near generator building (approximately 42 square feet);
- Uchida and Chin Buildings slabs (these slabs will be the site for the future assembly of the Keck 1 and 2 buildings - approximately total 416 square feet);
- Webmet (approximately 9.42 square feet);
- Allsky Area (no physical structure);
- Climate Reference Network meteorological instruments (approximately 96 square feet);
- Solar panel slab (approximately 25 square feet);
- Rain bucket windshield (approximately 50.24 square feet);
- ASIAA test site near the Arizona building (approximately 36 square feet);
- National Weather Service Max/Min thermometer base (approximately 4 square feet);
- Base for future Navy Camera (approximately 64 square feet);
- 1967 HELCO Power transformer structures -
  - 1991 updated (approximately 21.9 square feet);
  - chain link fence (enclosing approximately 232.78 square foot area);
- 1986 Power Distribution panel box near AEC building (approximately 8 square feet);
- 1987 UH VYSOS Building (approximately 47.66 square feet);
- 1987 University of Denver FTIR (approximately 196 square feet);
- 1994 GONG (approximately 670.75 square feet);
- 1995 AMIBA Staff Building (approximately 288 square feet);
- 1995 University of Massachusetts Microwave Ozone and NRL Water Vapor Building (approximately 279 square feet);
- 1997 NDSC Building and Radiation Deck (approximately 8,500 square feet);
- 1997 Solar Radiation Deck on NDSC Building (approximately 660 square feet);
- 2001 GROUNDWINDS (approximately 450 square feet);
- 2004 UNM Sampler (approximately 5.25 square feet;
- 2004 Security gate for MLO (20 feet wide x 2 inches thick); and
- 2005 AMIBA antenna and accessory structures land located under E.O. 3646 (approximately 6,892 square feet);

Staff Note: Staff would like to clarify that CDUA HA-2556 was approved for the NDSC building in 1992, however it was constructed on the wrong location (TMK: 009).

The alleged, unauthorized: 1) construction of structures constructed before 1964 but remodeled, relocated, or modified after 1964; and 2) the unauthorized construction of structures constructed after 1964 constitute 33 separate violations that occurred without the departments and/or Board's approval constitute unresolved violations are the subject of the staff report.

REFERRAL OF ALLEGED VIOLATIONS TO THE LAND BOARD RATHER THAN THE HEARING OFFICER/ADMINISTRATIVE PENALTY SYSTEM (HOAPS):

The alleged violations have been referred to the Board of Land and Natural Resources (BLNR) rather than HOAPS because of the seriousness of the violations[4].

RESOLUTION OF UNAUTHORIZED LAND USES:

Conservation District

Chapter 13-5, Hawaii Administrative Rules (HAR) and Chapter 183C, Hawaii Revised Statutes (HRS), regulate land uses in the Conservation District by identifying a list of uses that may be allowed by Conservation District Use Permit. The chapters also provide for penalties, collection of administrative costs, costs associated with land and/or habitat restoration, and damages to state land for uses that are not allowed or for which no permit has been obtained. Chapter 13-5, HAR defines "land use" in part as: the placement or erection of any solid material on land or the grading, removing or dredging of any material or natural resource on land.

The alleged, unauthorized: 1) construction of structures constructed before 1964 but remodeled, relocated, or modified after 1964; and 2) the unauthorized construction of structures constructed after 1964 constitute 33 separate land uses that occurred in the Conservation District without a permit, and therefore allegedly violate the above chapters. Staff through this report recommends conditions to resolve the thirty-three (33) Conservation District violations. Pursuant to Chapter 183C, HRS, the maximum fine for a Conservation District violation is $2,000 per violation in addition to administrative costs, costs associated with the land and/or habitat restoration, if required, and damages to state land. After written or verbal notification from the Department, willful violation of this section may incur an additional fine of up to $2,000 per day per violation for each day the violation persists.

DISCUSSION:

Staff is particularly concerned about this case in that the violations occurred on Mauna Loa, which is considered a culturally significant area. Staff notes departmental records do not indicate that any approvals were received for the alleged, unauthorized violations, except for CDUA HA-2556, for the

4 HOAPS distinguishes between Level I and Level II violations, the former being the more serious category, which is referred to the Board, and the latter, minor violations, referred to HOAPS. Staff feels the unauthorized improvements are serious enough to warrant the Boards attention.

subdivision and construction of the NDSC structure, which by the way was not constructed in conformance with the permit declarations.

Staff notes that more than a year has elapsed since the initial site inspection on September 21, 2004 because staff was trying to get a total picture of all of the unauthorized improvements and because of pending questions with respect to NOAA's responsibility to comply with state laws. One of the issues relates to NOAA's misunderstanding of the E.O. and how it relates to management vs. ownership. NOAA may have been under the belief that they owned the land, and based on that assumption, they believed that were not required to comply with Conservation District laws. It is our belief that they were wrong on both points. An E.O. does not constitute fee ownership, and even if it did, staff would assert that NOAA must follow Conservation District regulations.

After-The-Fact (ATF) Conservation District Use Application

Staff notes Section A identifies structures constructed before 1964 and have not been expanded, and/or remodeled should be considered non-conforming. Staff recommends to the Board that the GMD submit and expedite an After-The-Fact (ATF) CDUA for the: 1) construction of structures constructed before 1964 but remodeled, relocated, or modified after 1964; and 2) the unauthorized construction of structures constructed after 1964 that constitutes thirty-three (33) separate land uses, within nine (9) months of the date of the Board's action.

Staff feels NOAA should have extra time to prepare the CDUA because a management plan for the NOAA site is required, pursuant to HAR, Section 13-5-24, identified land uses in the Resource subzone, R-3, ASTROMONY FACILITIES, "astronomy facilities under an approved management plan."

Staff notes although the majority of the land uses are meteorological land uses, NOAA would have had to apply for a Board approved CDUA for the structures. Because there are structures (AMIBA antenna and accessory structures, Solar Dome, NCAR High Altitude Observatory, GONG, UV VYSOS Building) that are for astronomy purposes, staff suggests NOAA apply for an astronomy CDUA.

Fines

Staff notes NOAA should be held accountable for the: 1) construction of structures constructed before 1964 but remodeled, relocated, or modified after 1964; and 2) the unauthorized construction of structures constructed after 1964, which constitute thirty-three (33) separate land use violations. Staff has separated the fine structure by square footage; anything less that 200 square feet staff considered a relatively minor land use, and anything over 200 square feet staff considered a major land use. The 120-foot meteorological tower was an exception and was considered a major structure due to its height and visibility.

Staff recommends that the Board fine NOAA $2,000 for the following 22 minor land uses:

- Rain Gauges;
- Dobson Dome shelter;
- Army Radio Transmitter Building;
- Army Communications Tower;
- Communications Structures:
- GPS Antenna;
- USGS Tilt & Strain Well structures;
- Wind sock;
- Old unused 16 foot tall communication tower near generator building;
- Webmet;
- Allsky Area;
- Climate Reference Network meteorological instruments;
- Solar panel slab;
- Rain bucket windshield;
- ASIAA test site near the Arizona building;
- National Weather Service Max/Min thermometer base;
- Base for future Navy Camera;
- HELCO Power transformer chain link fence;
- 1986 Power Distribution panel box near AEC building;
- 1987 UH VYSOS Building;
- 1987 University of Denver FTIR; and
- 2004 UNM Sampler.

Staff recommends to the Board to fine NOAA for the following 11 major land uses:

- $2,000 for the reconstruction of the 120 foot Meteorological Tower:
- $2,000 for the expansion of the Keeling Building;
- $2,000 for the upgrades to the NCAR High Altitude Observatory;
- $2,000 for placement of the two slabs for the Uchida and Chin Buildings (future Keck 1 and 2 buildings);
- $2,000 for the construction of the GONG;
- $2,000 for the construction of the AMIBA Staff Building;
- $2,000 for the construction of the University of Massachusetts Microwave Ozone and NRL Water Vapor Building;
- $2,000 for the construction of the (NDSC) Building and Radiation Deck;
- $2,000 for the construction of the Solar Radiation Deck on NDSC Building;
- $2,000 for the construction of the GROUNDWINDS; and
- $2,000 for the construction of the AMIBA antenna and accessory structures.

Staff recommends a $2,000 fine for the 22 minor land uses, and $22,000 for the 11 major land uses, total 33 separate land uses occurring at the MLO. Staff recommends to the Board an administrative fine of $2,000; total fines $26,000.00.

Staff would like to note that the requested fine, and ATF CDUA are consistent with other enforcement cases for the unauthorized structures, and non-conforming uses (HA-06-08 regarding Mauna Kea, OA-05-28 University of Hawaii at Manoa, Lyon Arboretum). Staff notes that the department is trying to resolve the enforcement case and have NOAA comply with Chapter 13-5, HAR, and Chapter 183C, HRS. Staff notes NOAA should go through the same CDUA process which similar facilities located at Mauna Kea, and Haleakala undergo.

Lastly, staff notes the terms and conditions of both E.O.'s 1720 and 3646 may need to be revisited. Staff will recommend to the Board that NOAA consult with the Hawaii District Land Division regarding this issue.

This submittal and notice of the Board's meeting will be sent to NOAA's Global Monitoring Division (GMD) by certified mail to the address of record in Colorado.

FINDINGS:

1. That the National Oceanic and Atmospheric Administration, Global Monitoring Division did in fact, authorize, cause or allow the unauthorized thirty-three (33) violations at the Mauna Loa Observatory (Rain Gauges, Dobson Dome shelter, Army Radio Transmitter Building, Army Communications Tower, Communications Structures, GPS Antenna, USGS Tilt & Strain Well structures, Wind sock, old unused 16 foot tall communication tower near generator building, Webmet, Allsky Area, Climate Reference Network meteorological instruments, Solar panel slab, Rain bucket windshield, ASIAA test site near the Arizona building, National Weather Service Max/Min thermometer base, Base for future Navy Camera, Power Distribution panel box near AEC building, UH VYSOS Building, University of Denver FTIR, 2004 UNM Sampler, 120 foot Meteorological Tower, Keeling Building, NCAR High Altitude Observatory, slabs for the Uchida and Chin Buildings (Keck 1 and 2), HELCO Power transformer chain link fence, GONG, AMIBA Staff Building, University of Massachusetts Microwave Ozone and NRL Water Vapor Building, (NDSC) Building and Radiation Deck, Solar Radiation Deck on NDSC Building, GROUNDWINDS, AMIBA antenna and accessory structures), to occur;

2. That the National Oceanic and Atmospheric Administration, Global Monitoring Division's unauthorized land uses are of a serious nature;

3. That the unauthorized land uses occurred within the State Land Use Conservation District, Resource subzone; and

4. That the National Oceanic and Atmospheric Administration, Global Monitoring Division was aware of the location of Conservation District boundaries.

AS SUCH, STAFF RECOMMENDS AS FOLLOWS:

That, pursuant to Chapter 183C, Hawaii Revised Statutes (HRS), the Board find NOAA's Global Monitoring Division (GMD) in violation of Chapter 183C HRS and Chapter 13-5, Hawaii Administrative Rules (HAR), and is subject to the following:

1. That the National Oceanic and Atmospheric Administration, Global Monitoring Division in fact, authorize, cause or allow the unauthorized thirty-three (33) violations to occur at the Mauna Loa Observatory (Rain Gauges; Dobson Dome shelter; Army Radio Transmitter Building; Army Communications Tower; Communications Structures: GPS Antenna; USGS Tilt & Strain Well structures; Wind sock; Old unused 16 foot tall communication tower near generator building; Webmet; Allsky Area; Climate Reference Network meteorological instruments; Solar panel slab; Rain bucket windshield; ASIAA test site near the Arizona building; National Weather Service Max/Min thermometer base; Base for future Navy Camera; Power Distribution panel box near AEC building; UH VYSOS Building; University of Denver FTIR; 2004 UNM Sampler. 120 foot Meteorological Tower: Keeling Building; NCAR High Altitude Observatory; slabs for the Uchida and Chin Buildings (Keck 1 and 2); HELCO Power transformer chain link fence; GONG; AMIBA Staff Building; University of Massachusetts Microwave Ozone and NRL Water Vapor Building; (NDSC) Building and Radiation Deck; Solar Radiation Deck on NDSC Building; GROUNDWINDS; AMIBA antenna and accessory structures, to occur; The National Oceanic and Atmospheric Administration, Global Monitoring Division is fined a total of $24,000 for thirty-three (33) Conservation District violations;

2. The National Oceanic and Atmospheric Administration, Global Monitoring Division is fined an additional $2,000.00 for OCCL administrative costs associated with the subject violations;

3. The National Oceanic and Atmospheric Administration, Global Monitoring Division shall pay all fines (**total $26,000.00**) within thirty (30) days of the date of the Board's action;

4. That the National Oceanic and Atmospheric Administration, Global Monitoring Division shall submit and execute an After-The-Fact (ATF) Conservation District Use Application (CDUA) for the thirty-three (33) separate land use violations. An ATF CDUA shall be submitted pursuant to HAR, Section 13-5-24, identified land uses in the Resource subzone, R-3, ASTROMONY FACILITIES, "astronomy facilities under an approved management plan," within nine (9) months of the date of the Board of Land and Natural Resources action;

5. That NOAA will consult with the Hawaii District Land Division regarding the terms and conditions land under E.O. 1720 and E.O. 3646;

6. No further work shall occur on the subject parcel within the Conservation District, without the Board of Land and Natural Resources approval; Chairman's approval and/or OCCL approval. If further work occurs in the Conservation District without the appropriate approvals; the alleged will be fined an additional $2,000 a day;

7. That in the event of failure of the University of Hawaii to comply with any order herein, the alleged shall be fined an additional $2,000 per day until the order is complied with; and

8. That in the event of failure of the alleged or the landowners to comply with any order herein, the matter shall be turned over to the Attorney General for disposition, including all administrative costs.

Respectfully submitted,

Dawn T. Hegger,
Office of Conservation and Coastal Lands
Staff Planner

Approved for submittal:

PETER T. YOUNG, Chairperson
Board of Land and Natural Resources

Executive Order No. 1720

Setting Aside Land for Public Purposes

By this Executive Order, I, the undersigned, Governor of the Territory of Hawaii, by virtue of the authority in me vested by Section 91 of the Hawaiian Organic Act, and every other authority me hereunto enabling, do hereby order that the public land hereinafter described be, and the same is, hereby set aside for the uses and purposes of the United States of America.

FOR a United States Weather Bureau Station Site, to be under the control and management of the United States Department of Commerce.

U. S. Weather Bureau Station Site

Kaohe 5, Hamakua, Hawaii, T. H.

Being portion of the Government Land of Kaohe

Beginning at the reference station "STAIR 1955" (Spike in concrete marked "STAIR 1955") at the northeast corner of this parcel of land, the true azimuth and distance from said reference station "STAIR 1955" to the Government Survey Triangulation Station "AHUMOA" being: 172° 56' 40" 99,804.00 feet, as shown on Government Survey Registered Map 1641, thence running by azimuths measured clockwise from True South:-

1. 4° 12' 30" 420.00 feet along Mauna Loa Forest and Game Reserve (Executive Order 1288) to a 3/4-inch pipe;
2. 94° 12' 30" 420.00 feet along Mauna Loa Forest and Game Reserve (Executive Order 1288) to a 3/4-inch pipe and passing over a 1/2-inch pipe at 210.00 feet;
3. 184° 12' 30" 420.00 feet along Mauna Loa Forest and Game Reserve (Executive Order 1288) to a 3/4-inch pipe;

EXHIBIT 1

4. 274° 12' 30" 420.00 feet along Mauna Loa Forest and Game Reserve (Executive Order 1288) to the point of beginning passing over a 1/2-inch pipe at 210.00 feet and containing an AREA OF 4.05 ACRES.

In Witness Whereof, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed. Done at the Capitol at Honolulu this 28th day of January, Nineteen Hundred and Fifty-six.

Samuel Wilder King

Governor of the Territory of Hawaii

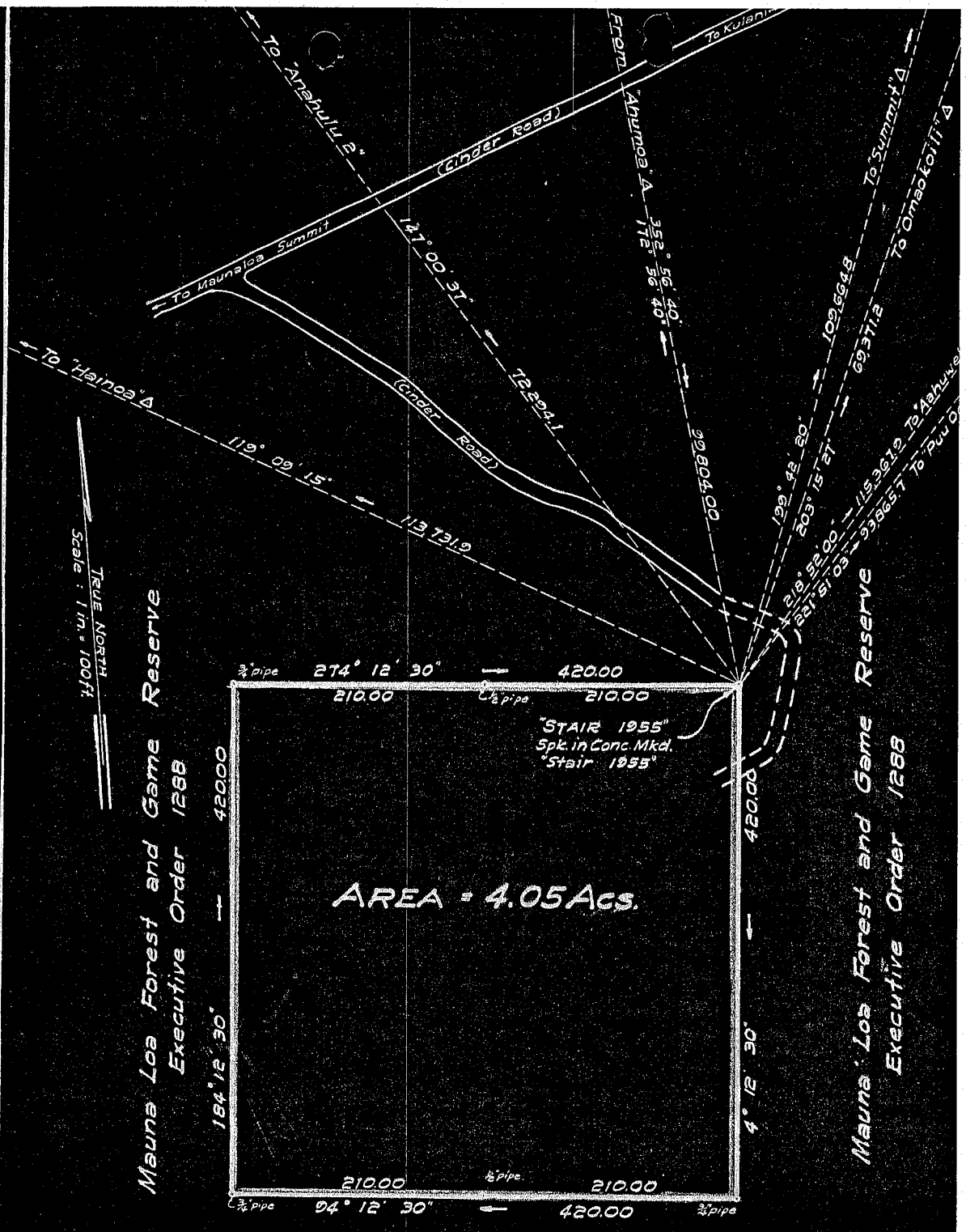
Approved as to form:

Edward N Sylva

Deputy Attorney General

GPS:bys

Checked by: lhm



U.S. WEATHER BUREAU STATION SITE

KAOHE 5, HAMAKUA, HAWAII, T. H.

Scale : 1 in. = 100 ft.

Survey & Plan by
C. L. & D. J. Murray
December, 1955

Origin of azimuths "AHUHOA" Δ

Tax Map : 4-4-16

C. S. F. No. 12,333

SURVEY DEPARTMENT
TERRITORY OF HAWAII

Tracing by

Executive Order No. 3646

Setting Aside Land for Public Purposes

By this Executive Order, I, the undersigned, Governor of the State of Hawaii, by virtue of the authority in me vested by Section 171-11, Hawaii Revised Statutes, and every other authority me hereunto enabling, do hereby order that the public land hereinafter described be, and the same is, hereby set aside for the following public purposes: FOR MAUNA LOA CLIMATOLOGICAL AND ATMOSPHERIC RESEARCH OBSERVATORY SITE, to be under the control and management of the United States Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), situate at Kaohe 5, Hamakua, Island of Hawaii, Hawaii, being a portion of the Government Land of Kaohe 5, containing an area of 4.05 acres, SUBJECT, HOWEVER, to portion of a Perpetual Non-Exclusive Lava Diversion Barrier Easement covered by Grant of Easement: State of Hawaii to the United States of America by its Department of Commerce dated October 8, 1985 and recorded in Liber 18992, Page 683, more particularly described in Exhibit "A" and delineated on Exhibit "B," both of which are attached hereto and made parts hereof, said exhibits being respectively, a survey description and survey map prepared by the Survey Division, Department of Accounting and General Services, State of Hawaii, both being designated C.S.F. No. 22,112 and dated May 31, 1994.

SUBJECT, HOWEVER, that upon cancellation of this executive order and, or in the event of non-use or abandonment of the premises or any portion thereof for a continuous period of one (1) year, the United States Department of Commerce, National Oceanic and Atmospheric Administration shall, within a reasonable time, restore the premises to a condition satisfactory and acceptable to the Department of Land and Natural Resources, State of Hawaii.

SUBJECT, FURTHER, that the United States National Oceanic and Atmospheric Administration shall bear full responsibility for compliance with all of the conditions listed in Conservation District Use Permit No. HA-5/12/92-2556, dated October 30, 1992.

SUBJECT, FURTHER, to disapproval by the Legislature by two-thirds vote of either the Senate or the House of Representatives or by majority vote of both, in any regular or special session next following the date of this Executive Order.

In Witness Whereof, I have hereunto set my hand and caused the Great Seal of the State of Hawaii to be affixed.

Done at the Capitol at Honolulu this 7th day of March, Nineteen Hundred and 95

12808

Benjamin J. Cayetano
Governor of the State of Hawaii

Approved as to form:

Deputy Attorney General

Dated: October 31, 1994

STATE OF HAWAII
SURVEY DIVISION
DEPT. OF ACCOUNTING AND GENERAL SERVICES
HONOLULU

C.S.F. No. 22,112

May 31, 1994

MAUNA LOA CLIMATOLOGICAL AND
ATMOSPHERIC RESEARCH OBSERVATORY SITE

Kaohe 5, Hamakua, Island of Hawaii, Hawaii

Being a portion of the Government Land of Kaohe 5.

Beginning at a spike in concrete marked "STAIR-1955" at the northwest corner of this parcel of land and at the northeast corner of United States Weather Bureau Station, Governor's Executive Order 1720, the coordinates of said point of beginning referred to Government Survey Triangulation Station "AHUMOA" being 99,048.23 feet South and 12,259.09 feet East, thence running by azimuths measured clockwise from True South:-

1.	274° 12' 30"	420.00 feet along Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
2.	4° 12' 30"	420.00 feet along Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
3.	94° 12' 30"	420.00 feet along Mauna Loa Forest and Game Reserve, Governor's Executive Order 1288;
4.	184° 12' 30"	420.00 feet along United States Weather Bureau Station, Governor's Executive Order 1720 to the point of beginning and containing an AREA OF 4.05 ACRES.

EXHIBIT "A"

C.S.F. No. 22,112

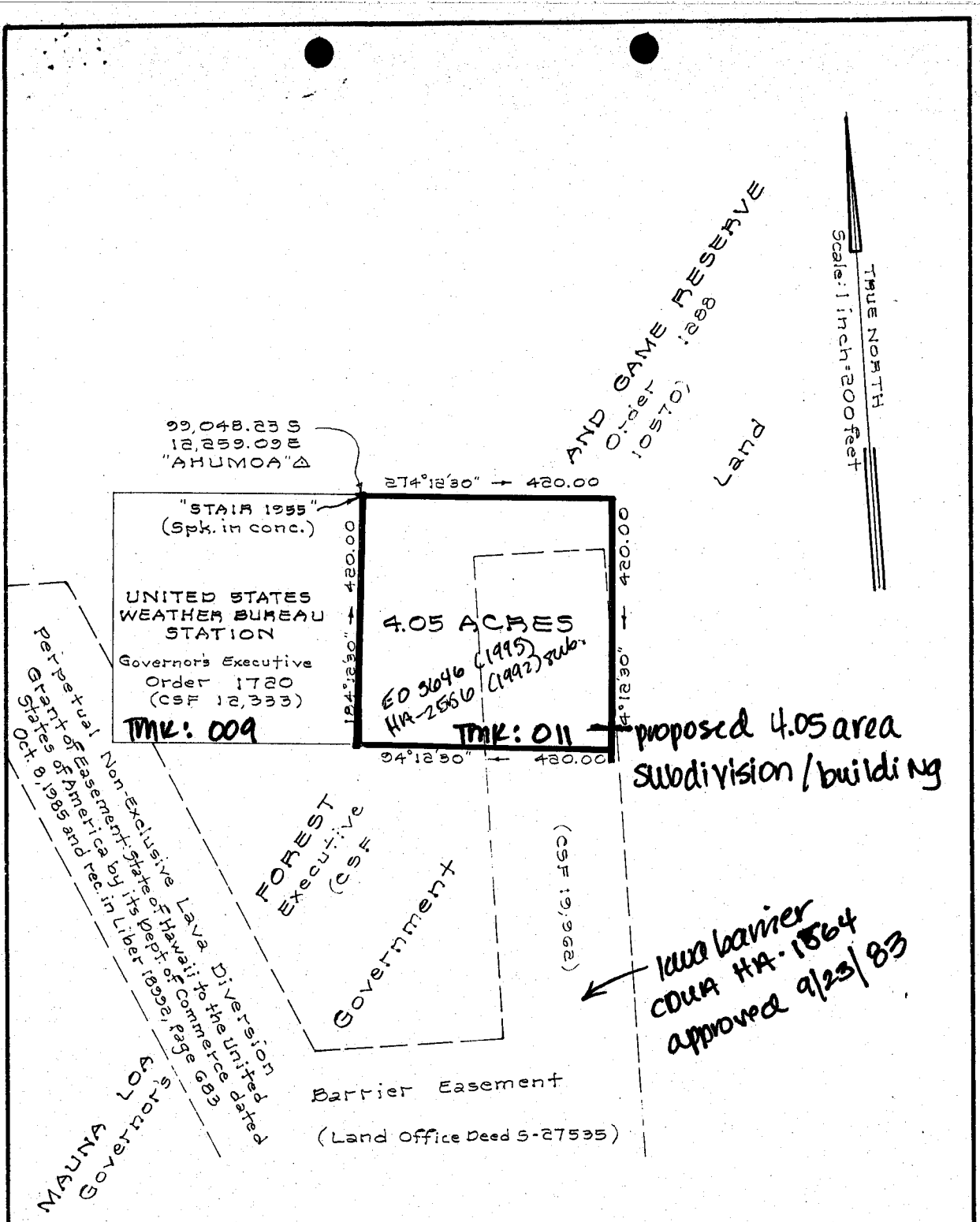
May 31, 1994

The above-described Mauna Loa Climatological and Atmospheric Research Observatory Site is subject however to portion of a Perpetual Non-Exclusive Lava Diversion Barrier Easement covered by Grant of Easement: State of Hawaii to the United States of America by its Department of Commerce dated October 8, 1985 and recorded in Liber 18992, Page 683 as shown on map attached hereto and made a part hereof.

SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

By: Raymond S. Nakamura
Raymond S. Nakamura
Land Surveyor gm

Compiled from data furn. by
R. M. Towill Corp. and Govt.
Survey Records.



MAUNA LOA CLIMATOLOGICAL AND ATMOSPHERIC RESEARCH OBSERVATORY SITE

Kaohe 5, Hamakua, Island of Hawaii, Hawaii

Scale: 1 inch = 200 feet

JOB H-124 (94)

C. BK.

TAX MAP: 4-4-16

C.S.F. NO. 28,112

SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

EXHIBIT "B"

R.S.N. May 31, 1994

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P.O. BOX 621
HONOLULU, HAWAII 96809

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JOHN P. KEPPELER, II
DONA L. HANAIKE

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION PROGRAM
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:OCEA:SKK

FILE NO.: HA-5/12/92-2556
180-Day Exp. Date: 11/8/92
DOC. NO.: 1642

OCT 30 1992

Ms. Carol Ciufolo
Real Property Contracting Officer
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
325 Broadway, MC43
Boulder, CO. 80303-3328

Dear Ms. Ciufolo:

Subject: Conservation District Use Application for a Subdivision; and for Subsequent Land Use to Construct a New 8,500 Square Foot Climatological/Atmospheric Research Center at Kaohe V, Hamakua, Hawaii; TMK: 4-4-16: 01

We are pleased to inform you that your Conservation District Use Application for a subdivision with subsequent land use to construct a new climatological/atmospheric research center was approved by the Board on October 16, 1992 subject to the following conditions:

1. The applicant shall comply with all applicable statutes, ordinances, rules and regulations of the Federal, State and County governments, and applicable parts of Section 13-2-21, Administrative Rules, as amended;

2. Since this approval is for use of conservation lands only, the applicant shall obtain appropriate authorization through the Division of Land Management, State Department of Land and Natural Resources for the occupancy of State lands;

3. The applicant, its successors and assigns, shall indemnify and hold the State of Hawaii harmless from and against any loss, liability, claim or demand for property damage, personal injury and death arising out of any act or omission of the applicant, its successors, assigns, officers, employees, contractors and agents under this permit or relating to or connected with the granting of this permit;

EXHIBIT 2

4. The applicant shall comply with all applicable Department of Health Administrative Rules;

5. The applicant shall submit a paint color selection for exterior surfaces to our Department prior to the approval of the construction plans;

6. Before proceeding with any work authorized by the Board, the applicant shall submit four (4) copies of the construction plans and specifications to the Chairperson or his authorized representative for approval for consistency with the conditions of the permit and the declarations set forth in the permit application. Three (3) of the copies will be returned to the applicant. Plan approval by the Chairperson does not infer approval required of other agencies. Compliance with Condition 1 remains the responsibility of the applicant;

7. Any work or construction to be done on the land shall be initiated within one (1) year of the approval of such use, and all work and construction must be completed within three (3) years of the approval of such use;

8. That the applicant shall be held responsible for the removal of all litter from the project and surrounding areas generated from the construction and maintenance of the project;

9. That the applicant shall implement appropriate measures to control potential erosion during and after construction;

10. That the applicant continue to make allowance for other telecommunication users at the site, and for public access to the area;

11. That the applicant notify the Department in writing when construction activity is initiated and when it is completed;

12. That in issuing this permit, the Department and Board has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Department may, in addition, institute appropriate legal proceedings;

13. That all representation relative to mitigation set forth in the accepted Environmental Assessment/Environmental Impact Statement for this proposed use are hereby incorporated as conditions of this approval;

14. That failure to comply with any of these conditions shall render this Conservation District Land Use application null and void; and

15. Other terms and conditions as prescribed by the Chairperson.

Please acknowledge receipt of this permit, with the above noted conditions, in the space provided below. Please sign two copies. Retain one and return the other.

Should you have any questions on any of these conditions, please feel free to contact our Office of Conservation and Environmental Affairs staff at 587-0377.

Very truly yours,

John P. Keppeler II

for WILLIAM W. PATY

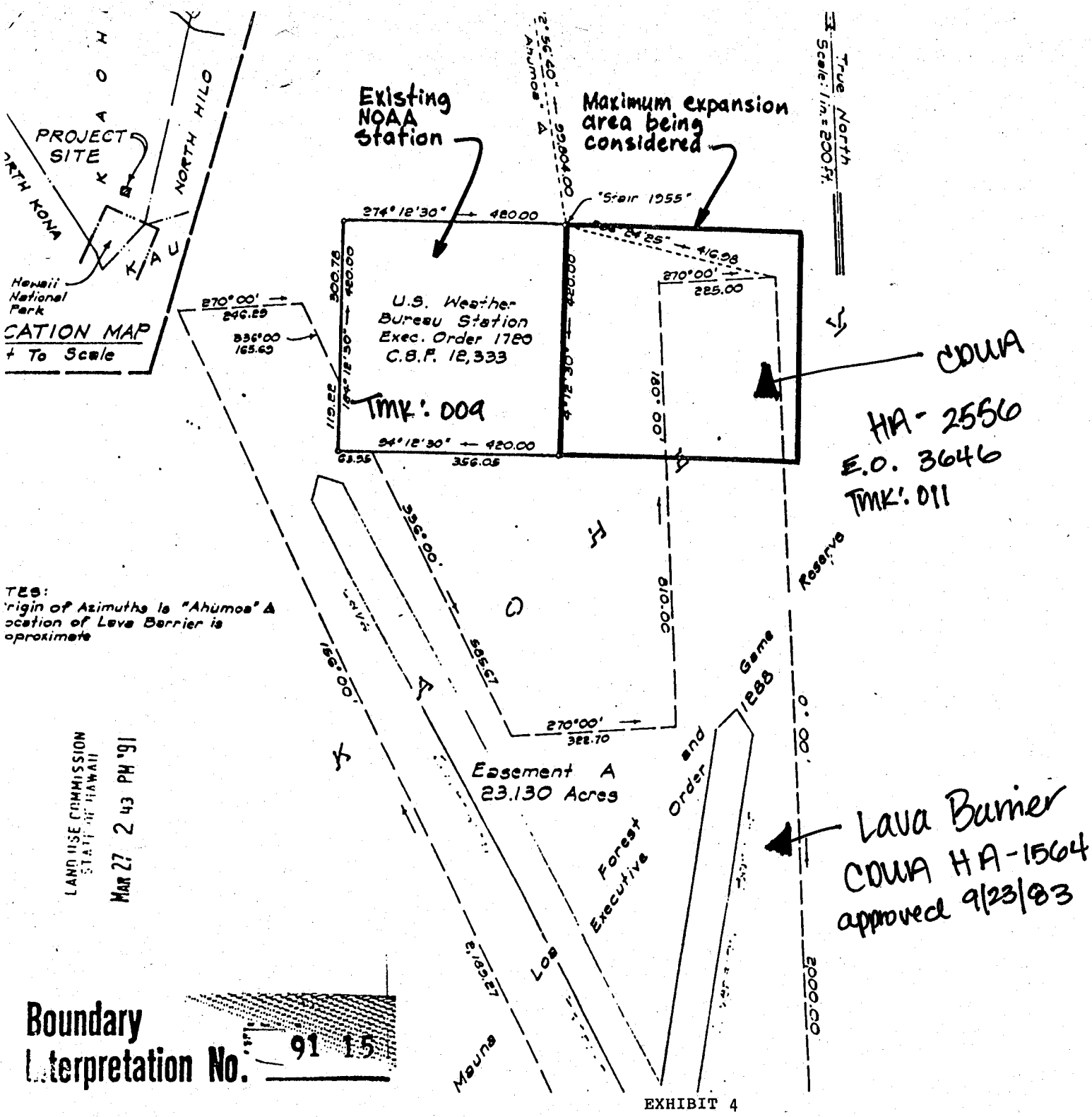
Receipt acknowledged

Carol Ciufolo

Applicant's Signature

Date 11/2/92

cc: Hawaii Board Member
Hawaii Land Agent
Hawaii County Planning Department
Hawaii County Dept. of Public Works
Hawaii County Dept. of Parks and Recreation
Hawaii County Dept. of Water Supply
DOH/OHA/OSP/DOT
Dr. Russ C. Schnell (Mauna Loa Observatory)



LAND USE COMMISSION
STATE OF HAWAII
MAR 27 2 43 PM '91

Boundary Interpretation No. 91 15

NOTES:
Origin of Azimuths is "Ahumoa" A
Location of Lava Barrier is approximate

Page__ of__

CDUA NO. HA - 2556
APPLICANT U.S. Department of Commerce - NOAA
AGENT
TMK 4 - 4 - 16 : 01

SUBZONE
- [ ] PROTECTIVE
- [X] RESOURCE
- [ ] LIMITED
- [ ] GENERAL

NORTH

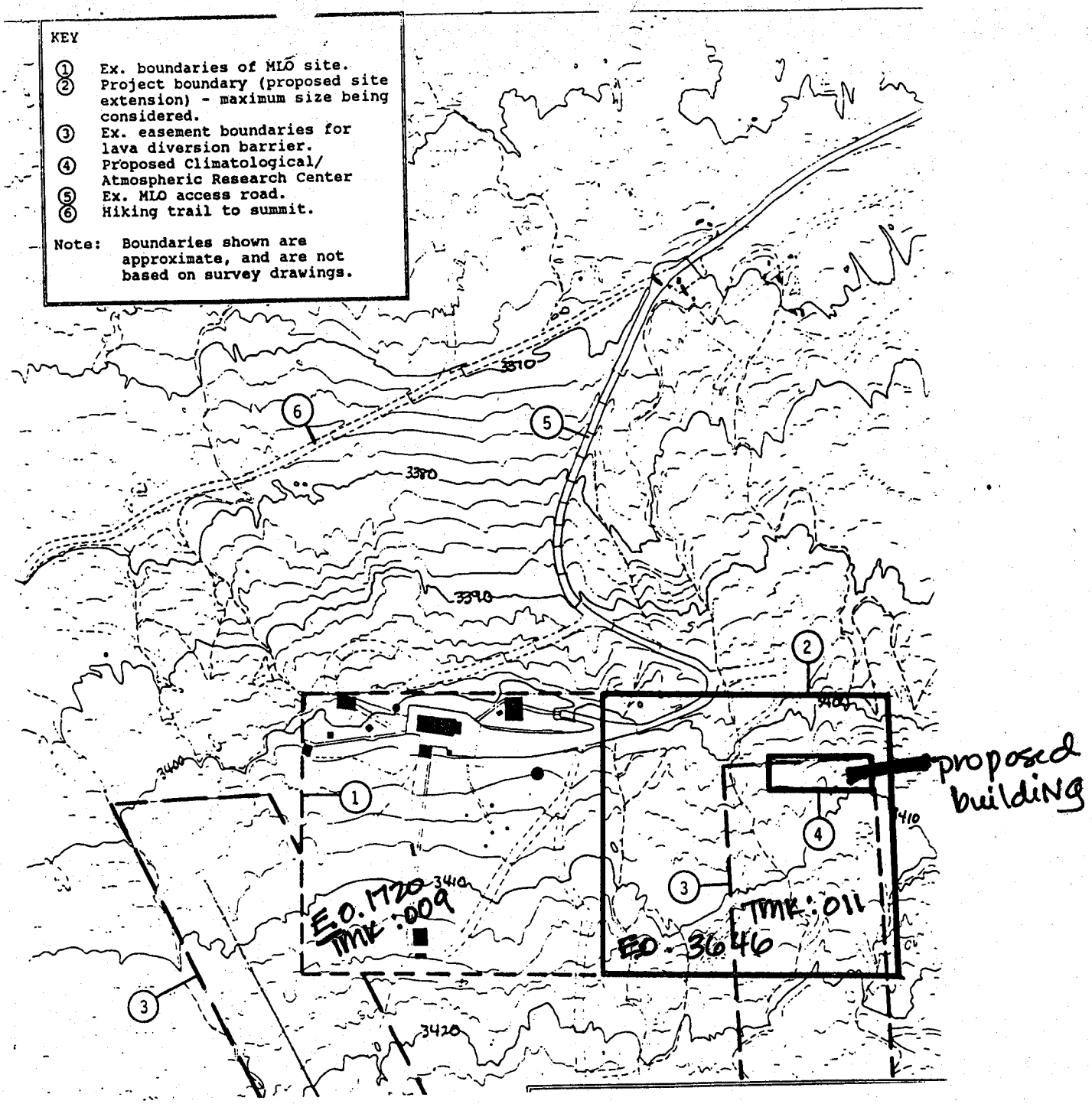


EXHIBIT 6

Page__ of___

CDUA NO. HA - 2556

APPLICANT U.S. Department of Commerce - NOAA

AGENT

TMK 4 - 4 - 16 : 01

NORTH

SUBZONE
- [ ] PROTECTIVE
- [x] RESOURCE
- [ ] LIMITED
- [ ] GENERAL

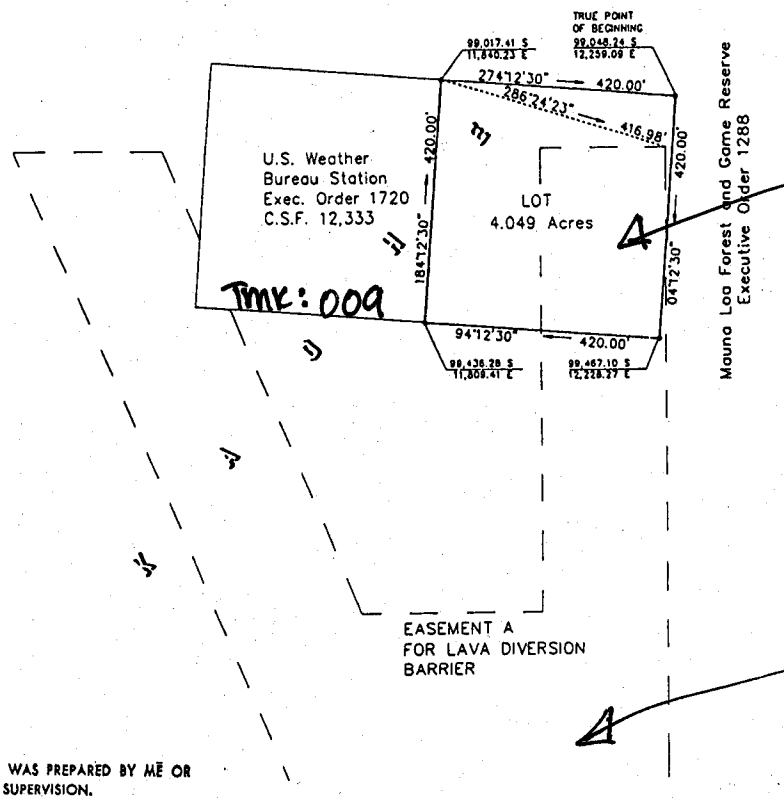
REFERENCE: CONSERVATION DISTRICT USE APPLICATION NO. HA-5/12/92-2556

CERTIFICATE OF SURVEY

LEGAL DESCRIPTION

A PARCEL OF LAND SITUATED AT KAOHE 5, HAMAKUA, COUNTY AND ISLAND OF HAWAII, STATE OF HAWAII, BEING A PORTION OF MAUNA LOA FOREST AND GAME RESERVE (EXECUTIVE ORDER 1288), MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTHEAST CORNER OF THIS PARCEL OF LAND, THE COORDINATES OF SAID POINT OF BEGINNING REFERRED TO GOVERNMENT TRAINGULATION STATION "AHUMOA" BEING 99,048.24 FEET SOUTH AND 12,259.09 FEET EAST AND THENCE RUNNING BY AZIMUTHS MEASURD CLOCKWISE FROM TRUE SOUTH; 4°12'30", 420.00 FEET ALONG REMAINDER OF MAUNA LOA FOREST AND GAME RESERVE (EXECUTIVE ORDER 1288); 94°12'30", 420.00 FEET ALONG REMAINDER OF MAUNA LOA FOREST AND GAME RESERVE (EXECUTIVE ORDER 1288); 184°12'30", 420.00 FEET ALONG U.S. WEATHER BUREAU STATION EXECUTIVE ORDER 1720 (C.S.F. 12,333); 274°12'30", 420.00 FEET ALONG REMAINDER OF MAUNA LOA FOREST AND GAME RESERVE (EXECUTIVE ORDER 1288), TO THE POINT OF BEGINNING AND CONTAINING AN AREA OF 4.049 ACRES.

SCALE: 1" = 200' TRUE NORTH



area under consideration for HA-2556

E.O. 3646
TMK: 011

lava barrier
HA-1564
approved 9/23/03

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

REGISTERED PROFESSIONAL SURVEYOR
CERTIFICATE NUMBER 4729.

FOR: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

R.M. TOWILL CORPORATION
ENGINEERS-SURVEYORS-PLANNERS-PHOTOGRAMMETRISTS

73-5574 MAIAU STREET, BAY 11B
KAILUA-KONA, HAWAII 96740

ZONE	SECTION	PLAT	DIVISION	COUNTY	STATE	DATE	JOB NO:
4	4	16	3	HAWAII	HAWAII	4-30-92	1-16557-0-S

RUSSELL FIGUEIROA
REGISTERED PROFESSIONAL LAND SURVEYOR
No. 4729
HAWAII, U.S.A.

EXHIBIT 5

Page__ of___

NORTH

CDUA NO. HA - 2556
APPLICANT U.S. Department of Commerce - NOAA
AGENT
TMK 4 - 4 - 16 : 01

SUBZONE
- [ ] PROTECTIVE
- [X] RESOURCE
- [ ] LIMITED
- [ ] GENERAL

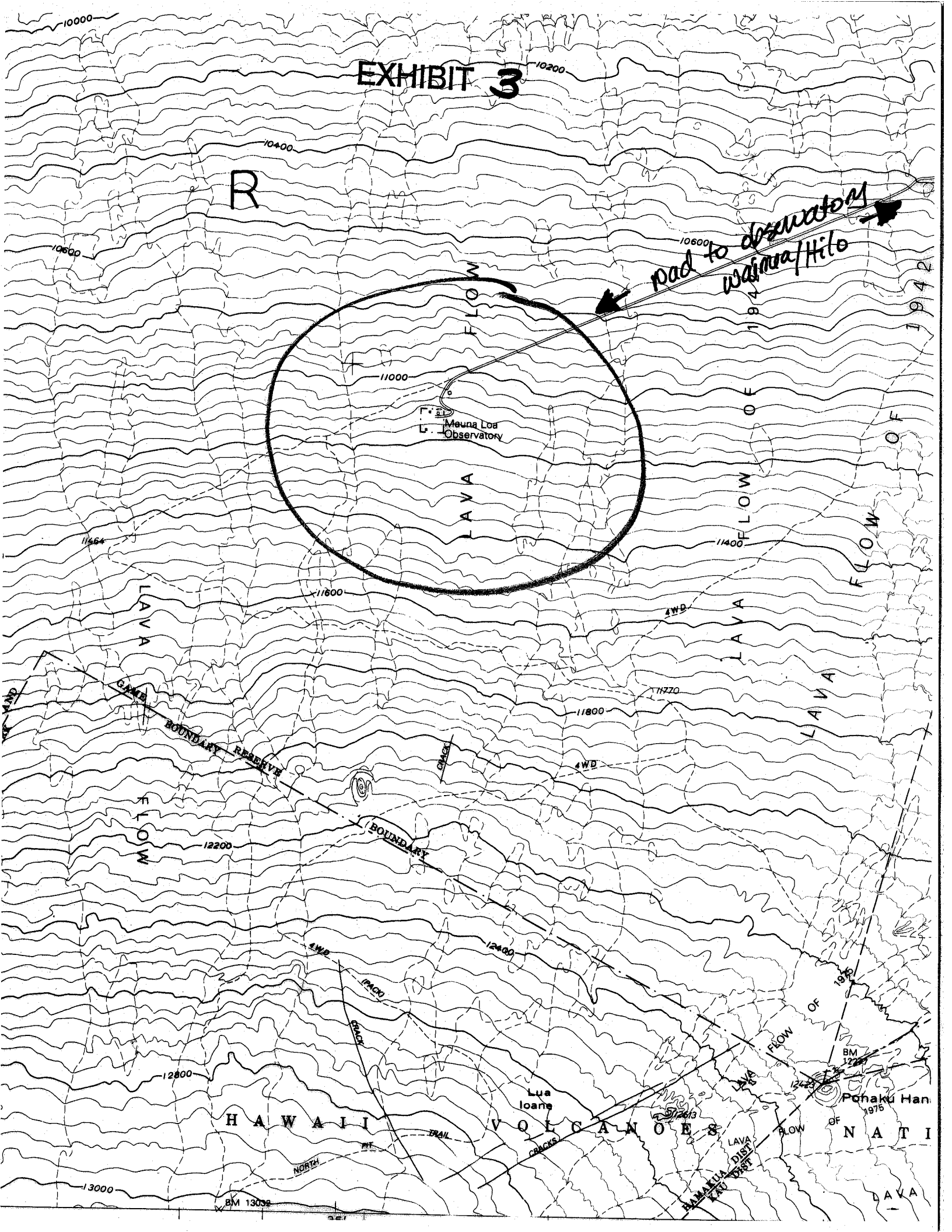


EXHIBIT 3
road to observatory
Waimea/Hilo
Mauna Loa Observatory
LAVA FLOW OF 1942
LAVA FLOW OF 1942
LAVA FLOW
GAME BOUNDARY RESERVE
BOUNDARY
CRACK
4WD
TRAIL
NORTH
Lua Ioane
HAWAII VOLCANOES
Pohaku Han
1975
BM 13032
10000
10200
10400
10600
11000
11400
11600
11770
11800
12200
12400
12800
13000

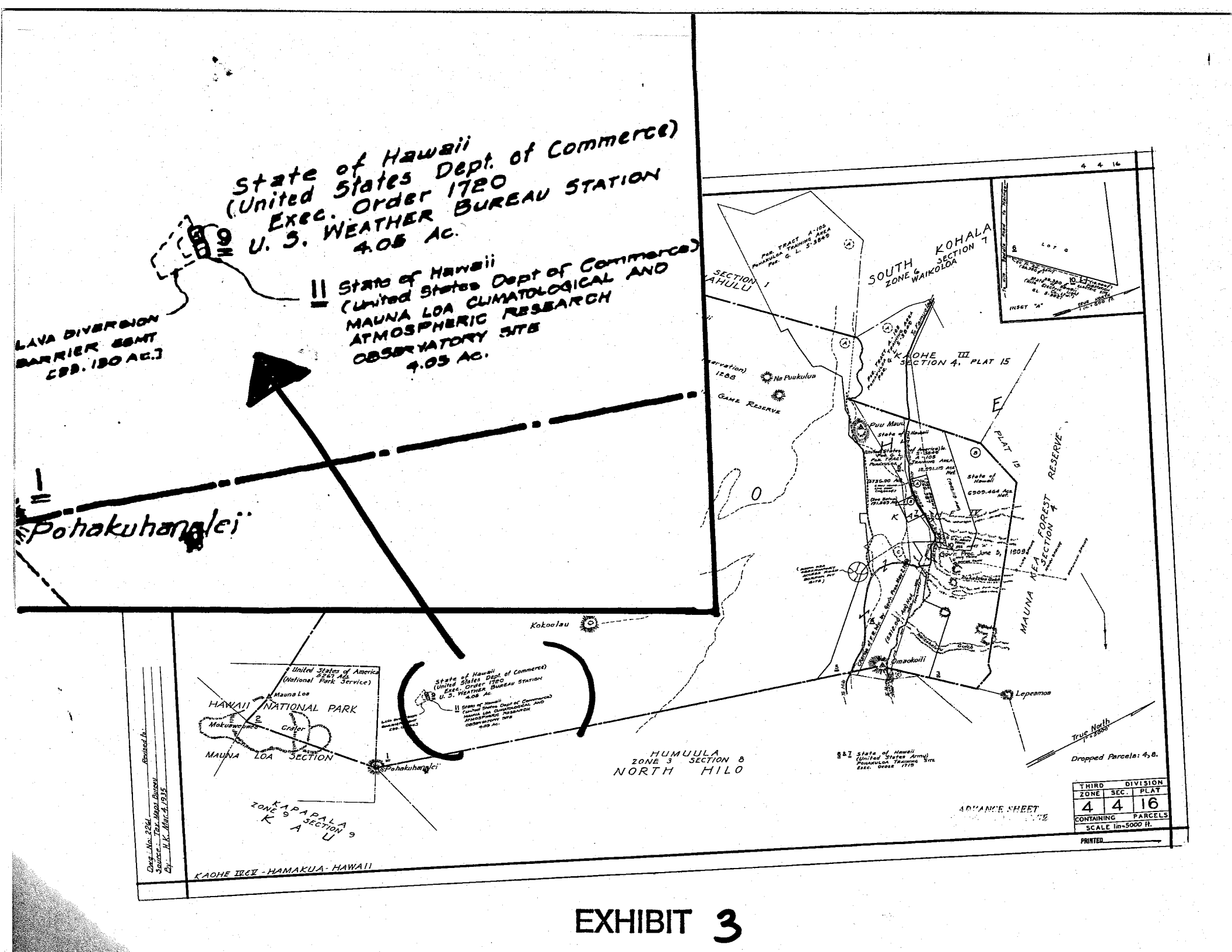
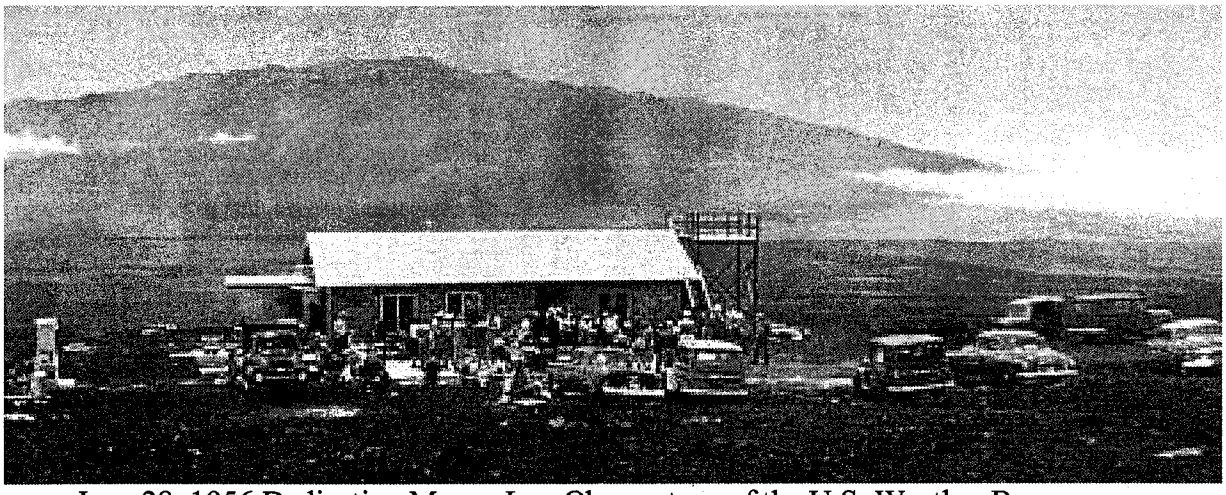

State of Hawaii
(United States Dept. of Commerce)
Exec. Order 1720
U. S. WEATHER BUREAU STATION
4.05 Ac.
State of Hawaii
(United States Dept of Commerce)
MAUNA LOA CLIMATOLOGICAL AND
ATMOSPHERIC RESEARCH
OBSERVATORY SITE
4.05 Ac.
LAVA DIVERSION
BARRIER CONT
CONS. 180 AC.]
Pohakuhanalei
SOUTH KOHALA
ZONE 6 SECTION 7
WAIKOLOA
SECTION 1
KAHULU
KAOHE III
SECTION 4, PLAT 15
Na Puukulua
GAME RESERVE
Puu Maui
State of Hawaii
PLAT 15
MAUNA KEA FOREST RESERVE
SECTION 4
Govt. Proc. June 5, 1809
Omaokoili
Lepeamoa
Kakoolau
United States of America
5267 Ac.
(National Park Service)
Mauna Loa
HAWAII NATIONAL PARK
Makunaiwa
Crater
MAUNA LOA SECTION
KAPAPALA
ZONE 9 SECTION 9
K A U
HUMUULA
ZONE 3 SECTION 8
NORTH HILO
6 & 7 State of Hawaii
(United States Army)
PUHAKULOA TRAINING SITE
Exec. Order 1719
True North
1" = 2000
Dropped Parcels: 4, 8.
THIRD DIVISION
ZONE 4 SEC. 4 PLAT 16
CONTAINING PARCELS
SCALE 1in=5000 ft.
PRINTED
ADVANCE SHEET
KAOHE III & IV - HAMAKUA - HAWAII
Orig. No. 2261
Source: Tax Map Bureau
By: H.K. Mar. 4, 1935
Revised to:

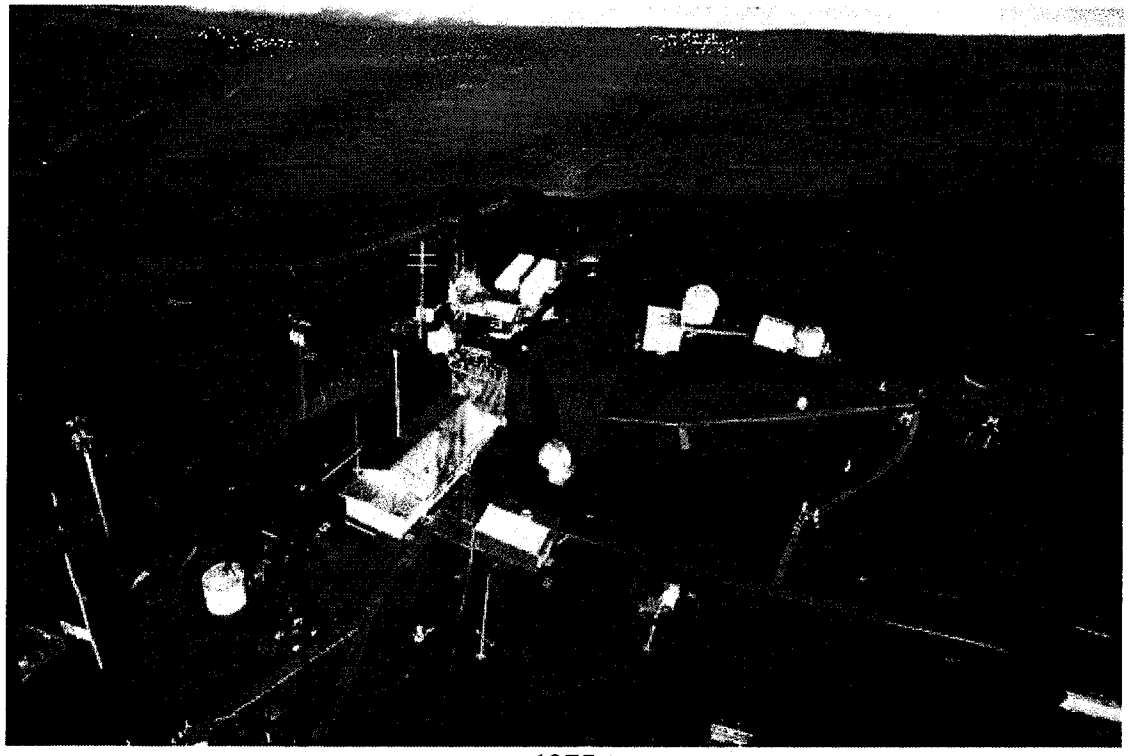
EXHIBIT 3

1951 Mauna Loa Observatory Structure at the summit

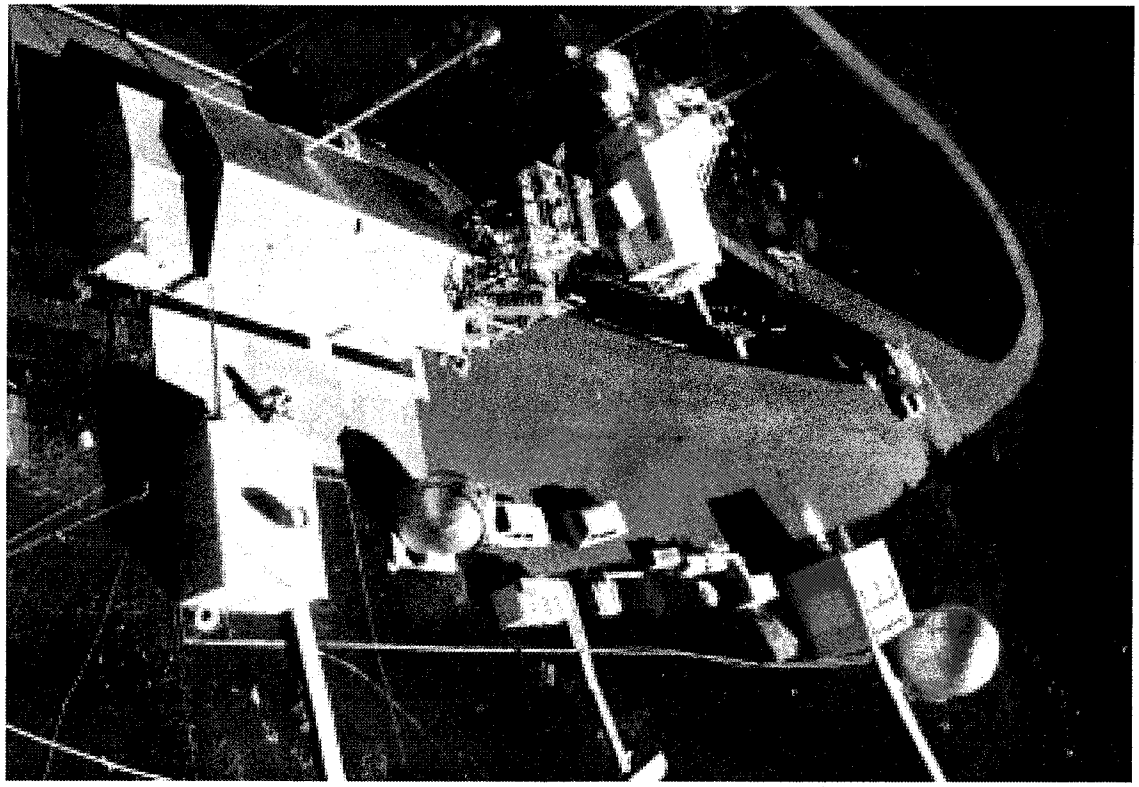


June 28, 1956 Dedication Mauna Loa Observatory of the U.S, Weather Bureau

EXHIBIT 3



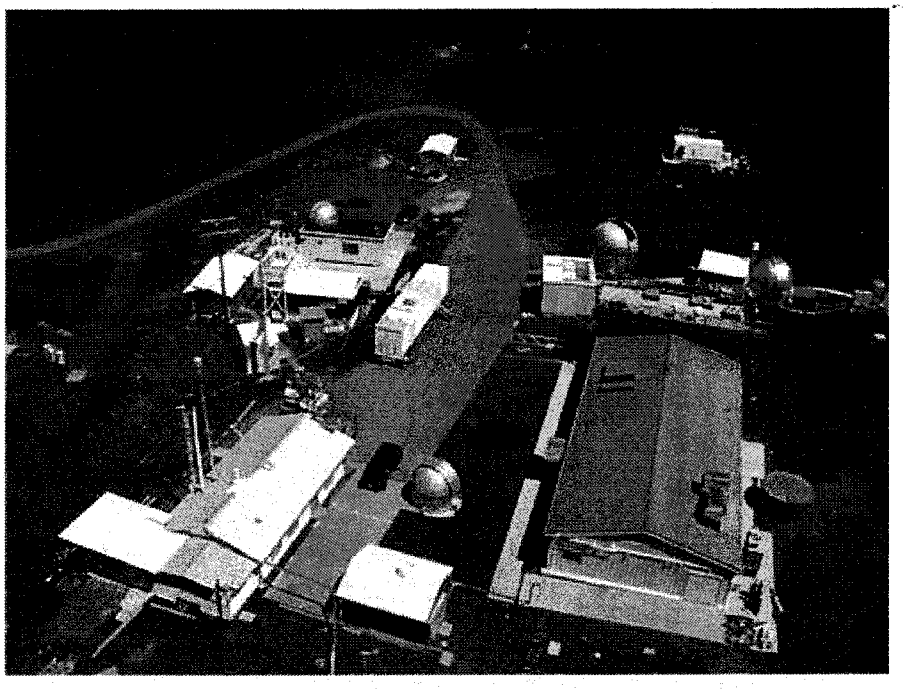
1975

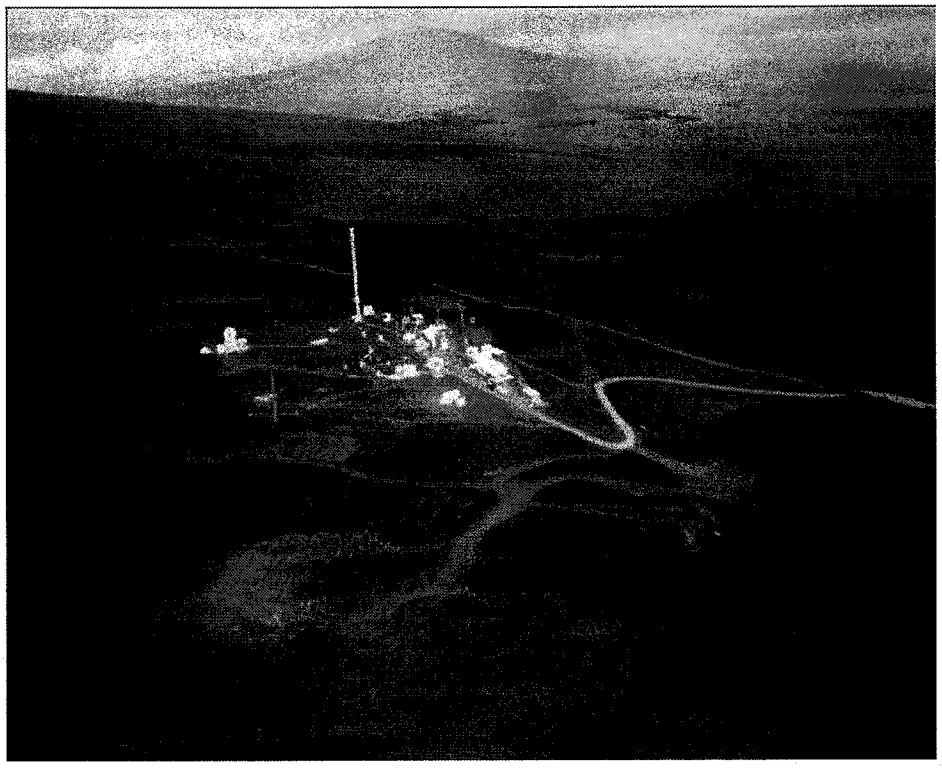


1986

2005 Photos

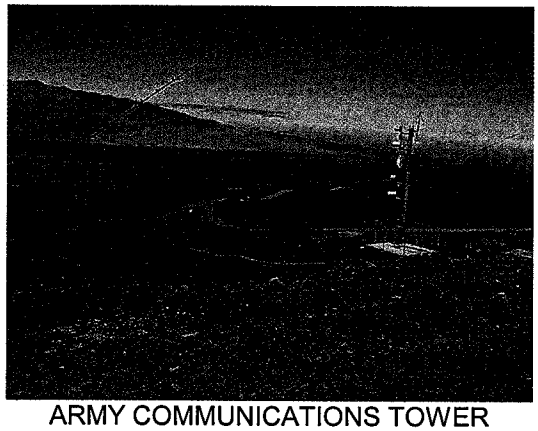
MLO View from Tower



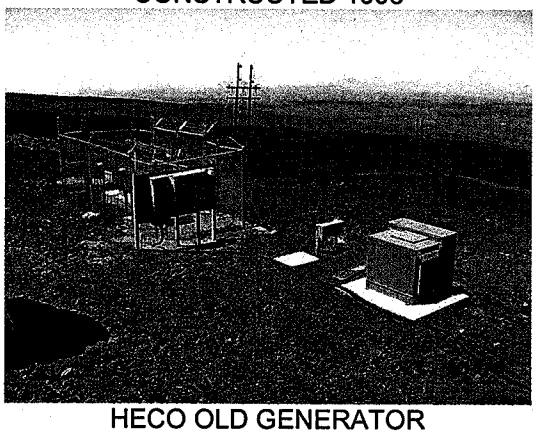


aerial view MLO

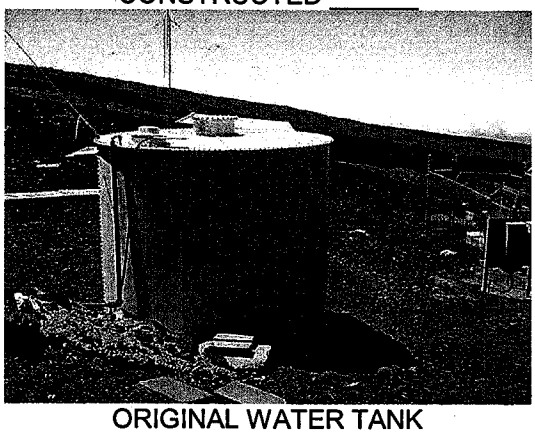
SITE VISIT SEPTEMBER 21, 2004
MAUNA LOA OBSERVATORY
FACILITY



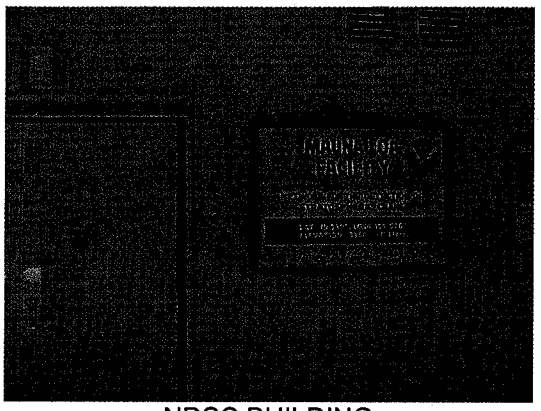
ARMY COMMUNICATIONS TOWER
CONSTRUCTED 1998



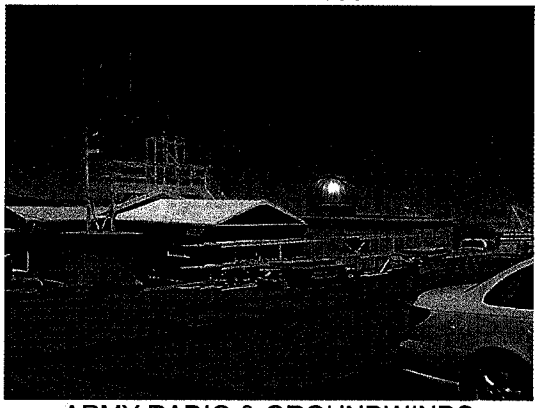
HECO OLD GENERATOR
(CONSTRUCTED LATE 1967)
HECO NEW GENERATOR
CONSTRUCTED



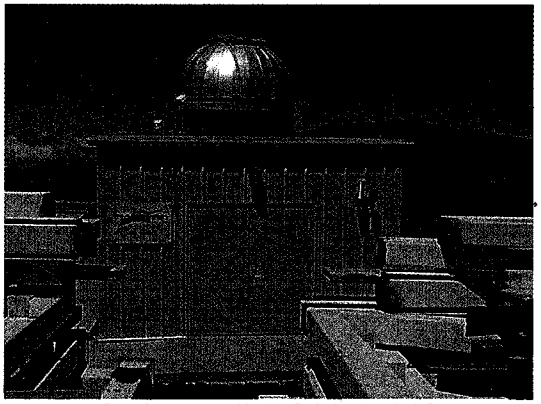
ORIGINAL WATER TANK



NDSC BUILDING
CDUP HA-2556

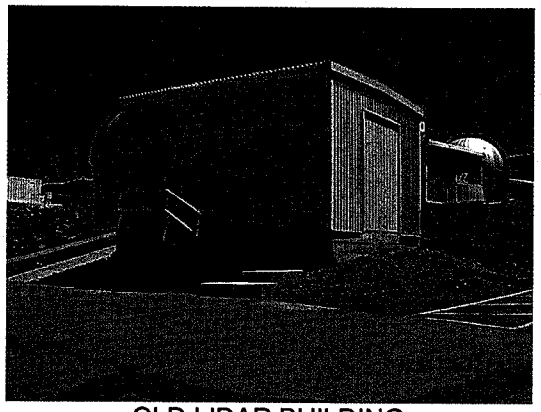


ARMY RADIO & GROUNDWINDS
BUILDINGS

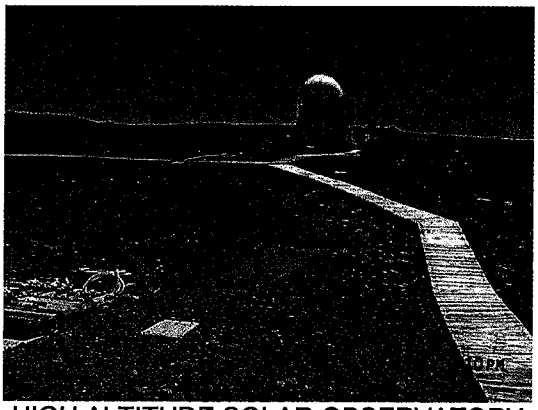


GROUNDWINDS BUILDING
2000

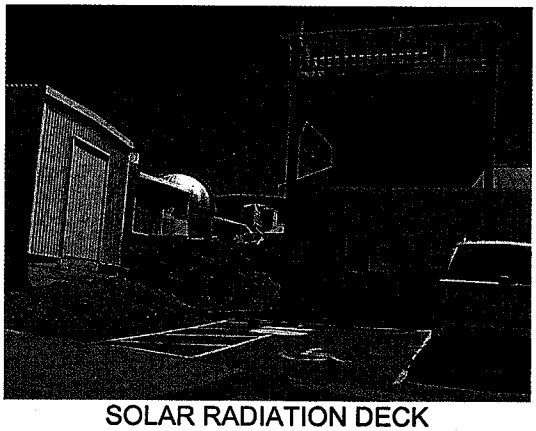
EXHIBIT 4



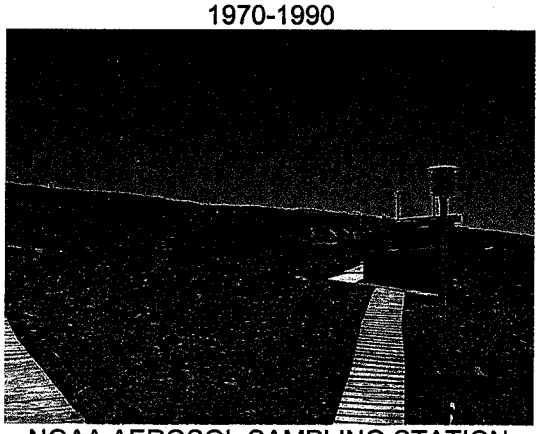
OLD LIDAR BUILDING
CURRENTLY A SHOP



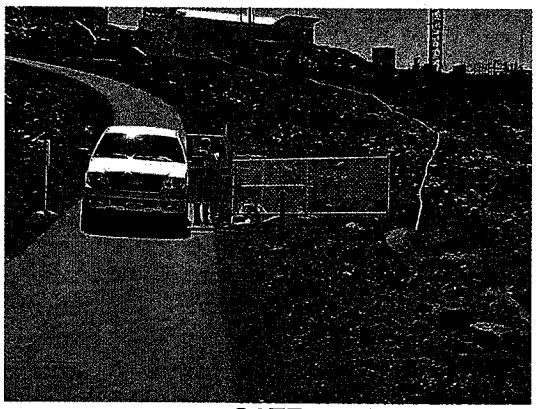
HIGH ALTITUDE SOLAR OBSERVATORY
CONSTRUCTED EARLY 1970
BOARDWALK CONSTRUCTED BETWEEN
1970-1990



SOLAR RADIATION DECK
& NDSC BUILDING

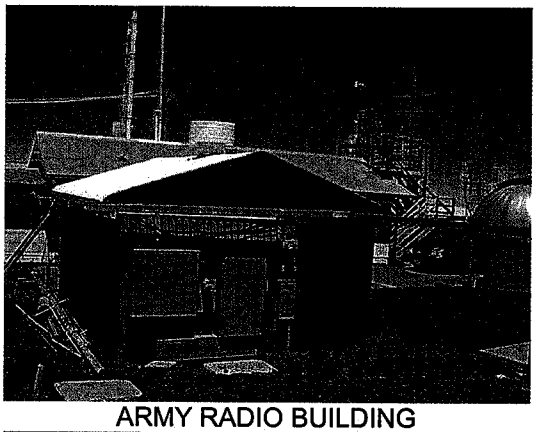


NOAA AEROSOL SAMPLING STATION

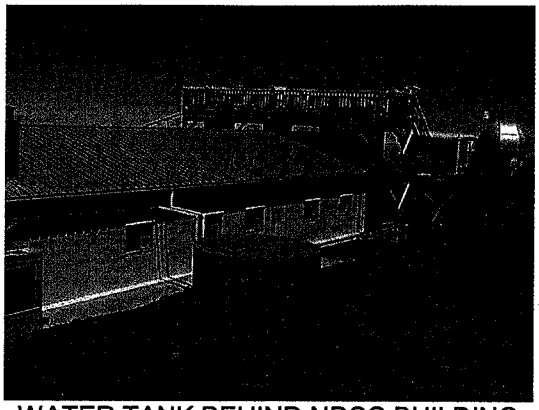


GATE

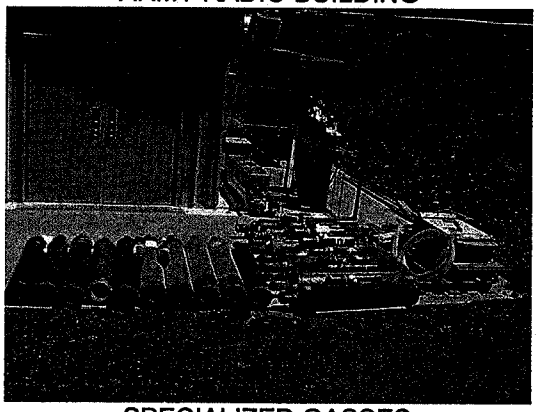
ORIGINAL RESTROOM



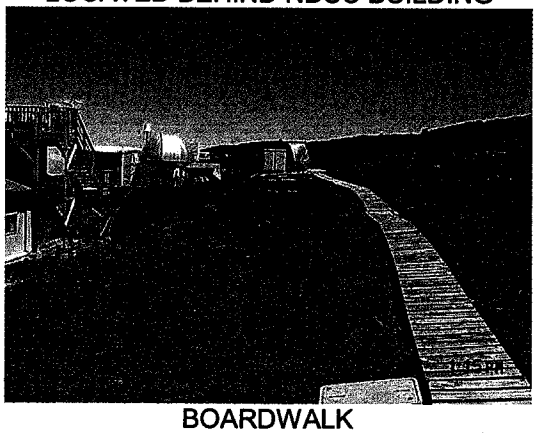
ARMY RADIO BUILDING



WATER TANK BEHIND NDSC BUILDING

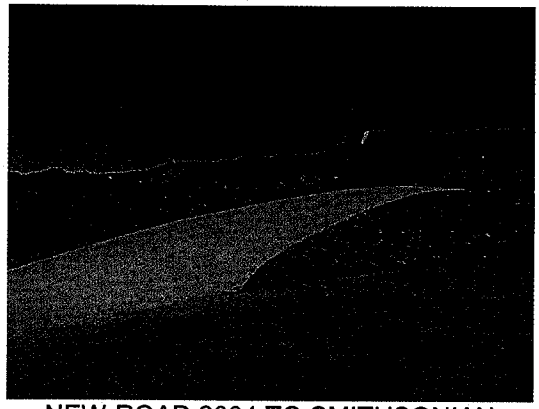


SPECIALIZED GASSES
LOCATED BEHIND NDSC BUILDING

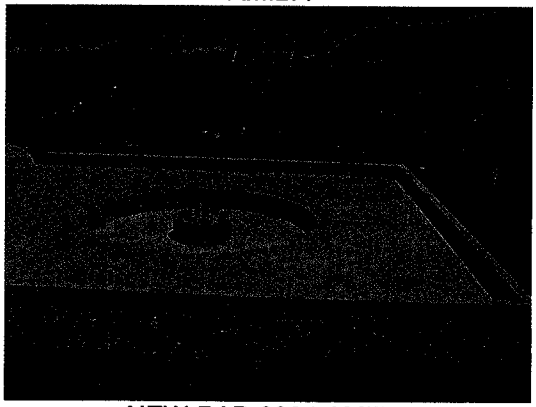


BOARDWALK
UH VYSOS (CENTER)
NITROGEN DIOXIDE PAD (RIGHT)

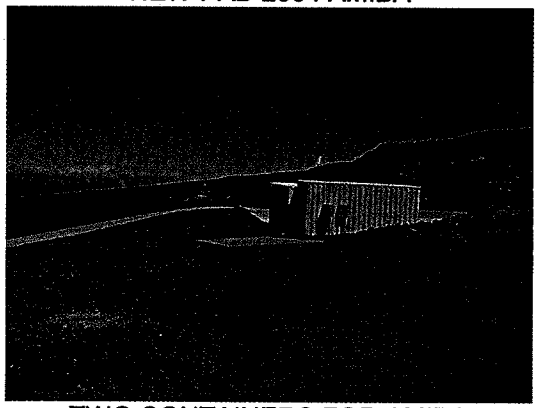
SITE VISIT SEPTEMBER 21, 2004



NEW ROAD 2004 TO SMITHSONIAN AMIBA

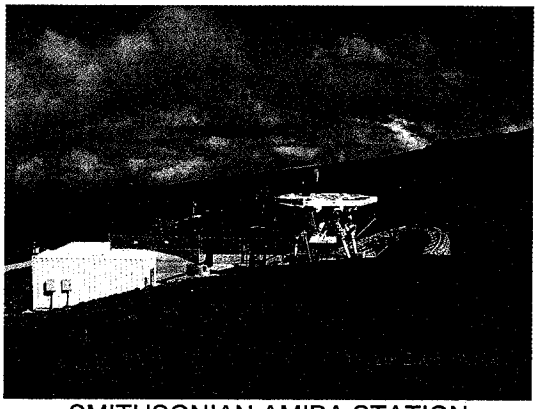


NEW PAD 2004 AMIBA

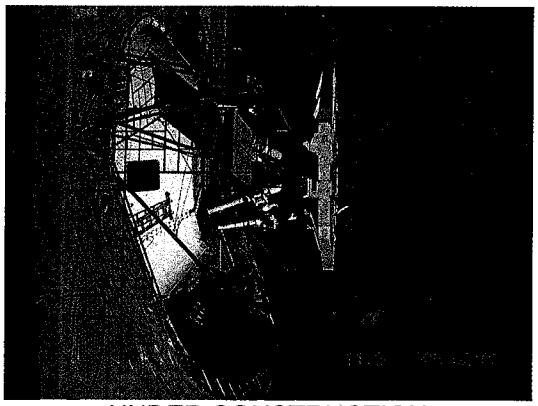


TWO CONTAINERS FOR AMIBA

SITE VISIT NOVEMBER 21, 2005



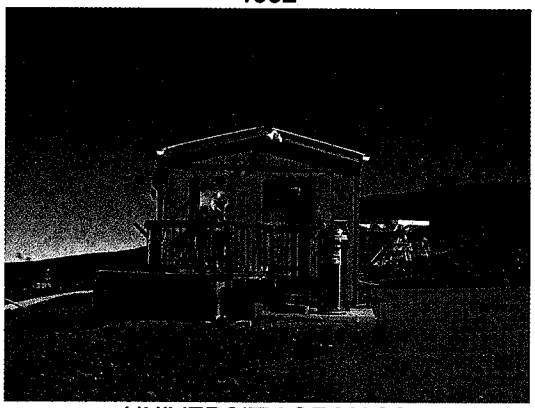
SMITHSONIAN AMIBA STATION



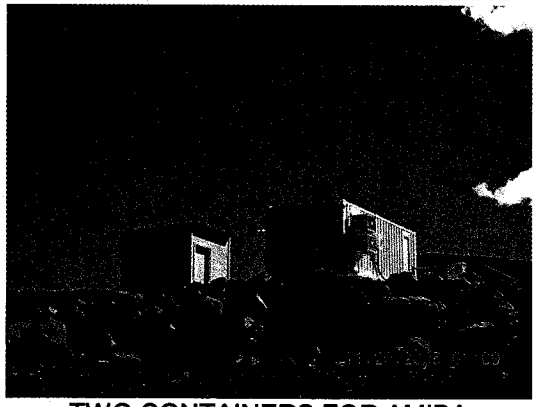
UNDER CONSTRUCTION

SITE VISIT NOVEMBER 21, 2005

WOODEN BUILDING/ VISITORS CENTER
1992



UNIVERSITY OF MASS
OZONE NRL WATER VAPOR BUILDING



TWO CONTAINERS FOR AMIBA

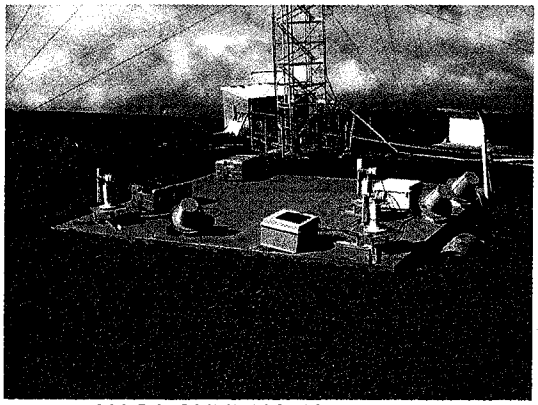
ARMY RADIO BUILDING

CONCRETE PAD ADJACENT TO KEELING
BUILDING

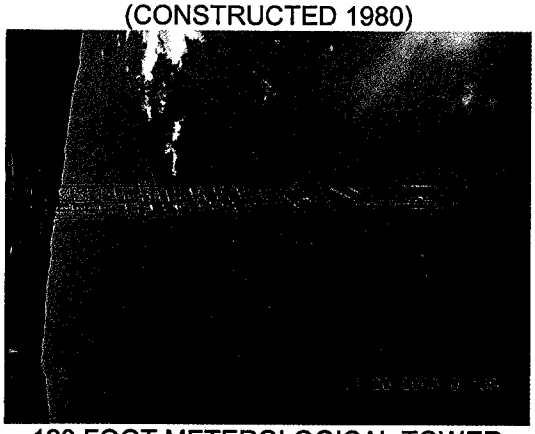
20 FOOT INTAKE TOWER
CONSTRUCTED 1970-1990
ORIGINAL GENERATOR SHACK

EXHIBIT 5

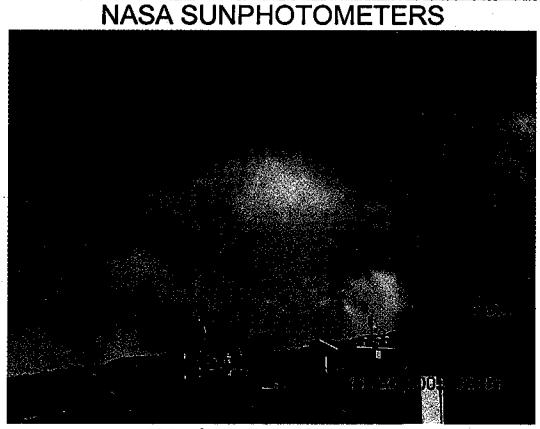
RADON/SO2 BUILDING
(CONSTRUCTED 1980)



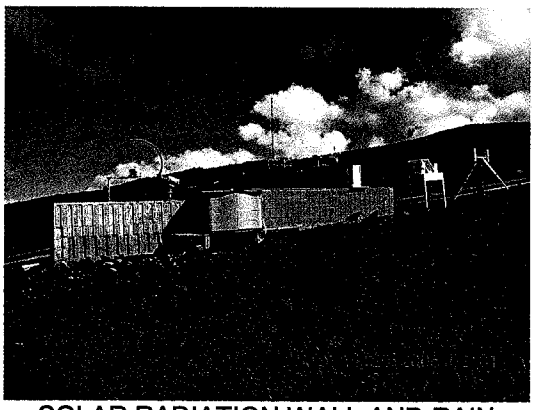
NASA SUNPHOTOMETERS



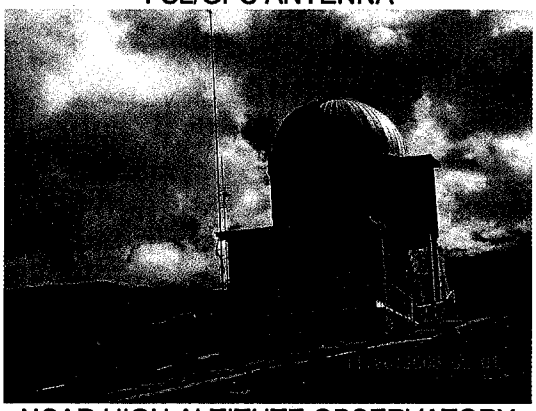
120 FOOT METEROLOGICAL TOWER
CONSTRUCTED BETWEEN 1970 - 1991



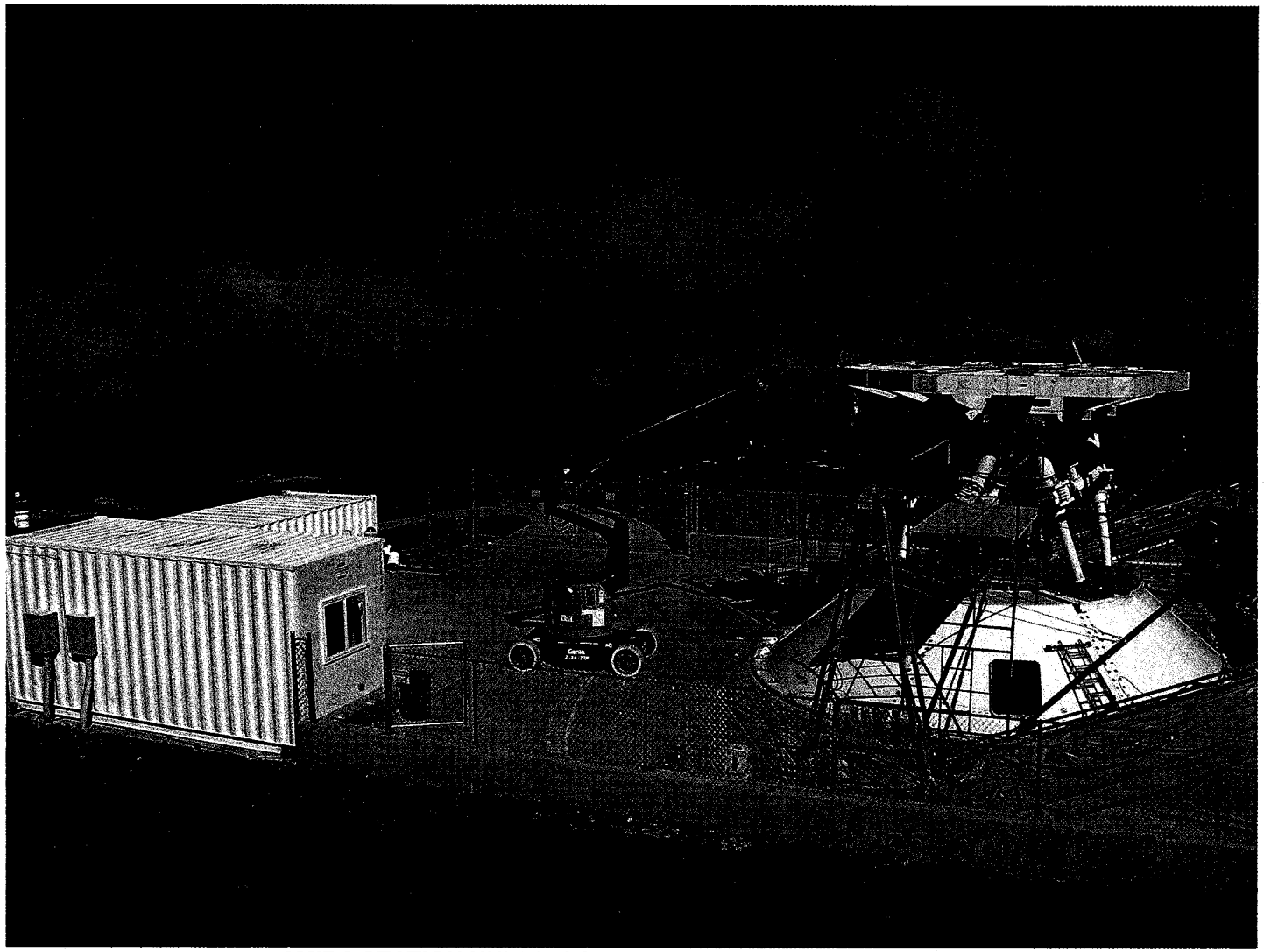
FSL/GPS ANTENNA



SOLAR RADIATION WALL AND RAIN
COLLECTOR



NCAR HIGH ALTITUTE OBSERVATORY
MAUNA LOA SOLAR OBSERVATORY



AMIBA STATION UNDER CONSTRUCTION NOVEMBER 21, 2005

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:DH

Mauna Loa Observatory

DEC 16 2005

Dr. Russ Schnell, Director
NOAA Observatory Operations
United States Department of Commerce
Oceanic and Atmospheric Administration
Oceanic and Atmospheric Research Laboratory
Climate Monitoring and Diagnostics Laboratory
325 Broadway – David Skaggs Research Center
Boulder, Colorado 80303

Dear Dr. Schnell,

On September 21, 2004, and November 21, 2005, the Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL) conducted a site inspection of the Mauna Loa Observatory located on Subject Parcels TMK's: (3) 4-4-006: 009 and 011.

The OCCL notes currently there are multiple land uses and structures on the subject parcels (meteorological towers, weather towers, radio stations, buildings, etc.). The OCCL notes departmental records indicate one Conservation District Use Application Permit (CDUP) HA-2556 approved by the Board of Land and Natural Resources on October 16, 1992 for subdivision of land to create a larger land area under an Executive Order[1], and an 8,500 square foot Climatological/Atmospheric Research Center building[2]; and was subject to fifteen terms and conditions (**Exhibit 1**).

The OCCL notes there are various land uses and structures on which we have no information on or permits, and therefore would like your help in: 1) verifying the structure; 2) its purpose; and 3) the date it was constructed (and/or is in the process of being constructed):

- AMIBA building and accessory structures;
- USGS Tilt & Strain and Well structures;
- Wind Sock;
- GONG;
- University of Massachusetts Microwave Ozone NRL Water Vapor;
- Groundwinds;
- Keck 1 and 2;

[1] This Executive order is known as E.O. 3646, approved by the Governor on March 7, 1995.
[2] The building is identified by Mauna Loa Observatory staff as the NDSC building.

EXHIBIT 6

- Army Radio Building;
- Army Communications Tower;
- AEC Building;
- Keeling Building;
- Butler Building;
- AMIBA staff building;
- Communication Structures;
- Power Structures;
- Task and Flask Storage;
- Storage Shed;
- Low Met. Tower;
- 120 foot Tower;
- Rain Gauges;
- UNM Sampler;
- UC Davis Samplers;
- NASA Sunphotometers;
- Solar Radiation Wall;
- Rain Collector;
- Webmet Area;
- "Allsky Area;"
- NCAR High Altitude Observatory (Mauna Loa Solar Observatory);
- Radon/SO2 Building;
- FSL/GPS Antenna;
- Solar Radiation Deck;
- UH VYSOS Building;
- University of Denver FTIR;
- Solar Dome;
- Dobson Dome; and
- EPA Tower;

A map has been provided to you, which was given to the OCCL staff while at the recent site inspection. The OCCL notes this information should be provided no later than January 15, 2006. Should you have any questions on any of these conditions, please feel free to contact Dawn Hegger of at 587-0380.

Aloha,

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

c: Hawaii District Land Office

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

JAN 10 2006

REF:OCCL:DH

Mauna Loa Observatory

Dr. Russ Schnell, Director
NOAA Observatory Operations
United States Department of Commerce
Oceanic and Atmospheric Administration
Oceanic and Atmospheric Research Laboratory
Climate Monitoring and Diagnostics Laboratory
325 Broadway – David Skaggs Research Center
Boulder, Colorado 80303

Dear Dr. Schnell,

On September 21, 2004, and November 21, 2005, the Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL) conducted a site inspection of the Mauna Loa Observatory located on Subject Parcels TMK's: (3) 4-4-006: 009 and 011.

The OCCL notes departmental records indicate one Conservation District Use Application Permit (CDUP) HA-2556 approved by the Board of Land and Natural Resources on October 16, 1992 for subdivision of land to create a larger land area under Executive Order 3646[1], and an 8,500 square foot Climatological/Atmospheric Research Center building[2]; and was subject to fifteen terms and conditions (**Exhibit 1**).

On January 6, 2006, a conference call was conducted between the Hawaii District Land Office staff (Harry Yada), OCCL staff (Dawn Hegger, Sam Lemmo), and your office regarding land uses currently occurring at the Mauna Loa Observatory.

Please submit information on *all structures* located at the Mauna Loa Observatory[3], whether located on land for E.O. 3646 or E.O. 1720, and the following information on: 1) structures constructed

[1] This Executive order is known as E.O. 3646, approved by the Governor on March 7, 1995.
[2] The building is identified by Mauna Loa Observatory staff as the NDSC building.
[3] Structures so far identified: AMIBA building and accessory structures; USGS Tilt & Strain and Well structures; Wind Sock; GONG; University of Massachusetts Microwave Ozone NRL Water Vapor; Groundwinds; Keck 1 and 2; Army Radio Building; Army Communications Tower; AEC Building; Keeling Building; Butler Building; AMIBA staff building; Communication Structures; Power Structures; Task and Flask Storage; Storage Shed; Low Met. Tower; 120 foot Tower; Rain Gauges; UNM Sampler; UC Davis Samplers; NASA Sunphotometers; Solar Radiation Wall; Rain Collector; Webmet Area; "Allsky Area;" NCAR High Altitude Observatory (Mauna Loa Solar Observatory); Radon/SO2 Building; FSL/GPS Antenna; Solar Radiation Deck; UH VYSOS Building; University of Denver FTIR; Solar Dome; Dobson Dome; and EPA Tower

EXHIBIT 9

before 1964 that have not been expanded, and/or remodeled; 2) structures constructed *before* 1964 (that have been expanded, and/or remodeled; 3) all structures constructed *after* 1964; 4) summarize the square footage of the structure(s) area; and 5) the purpose of each structure (whether the structure is for astronomy or weather related - meteorlogical/climatological). Lastly, please provide a more detailed map of the area with labels for each structure and date of each structure. Lastly, the OCCL notes that any information that you provide will be used in the Enforcement Case, and therefore you might wish to state the reasons and rationale for the situation.

The OCCL appreciates your efforts to correct the situation for the unpermitted structures, and submit and process an After-The-Fact (ATF) Conservation District Use Application (CDUA). However, the issue must be resolved through the Board of Land and Natural Resources (Board) as an violation case, pursuant to Hawaii Administrative Rules (HAR), Section 13-5-31 (e), PERMIT APPLICATIONS, "no permit applications shall be processed by the department until any violations pending against the subject parcel are resolved.

The OCCL notes after we have received the information, and a date for a Board meeting has been set, a staff report will be written and presented to the Board regarding the Enforcement Case. The recommendations may reflect fines, and a recommendation to submit an ATF CDUA to resolve the Enforcement Case.

The OCCL notes this information should be provided no later than February 1, 2006. Should you have any questions on any of these conditions, please feel free to contact Dawn Hegger of at 587-0380.

Aloha,

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

c: Hawaii District Land Office
Chairman

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Oceanic and Atmospheric Research
Earth System Research Laboratory
325 Broadway – David Skaggs Research Center
Boulder, Colorado 80303-3337

February 15, 2006

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands
Department of Land and Natural Resources
Post Office Box 621
Honolulu, Hawaii 96809

Mr. Lemmo:

This letter is in response to your January 10, 2006 letter requesting additional information on the Mauna Loa Observatory of the National Oceanic and Atmospheric Administration (NOAA), Climate Monitoring and Diagnostics Laboratory (CMDL) (now the Global Monitoring Division of the NOAA Earth System Research Laboratory) as to dates structures were erected on Subject Parcels TMKs: (3) 4-4-006: 009 and 011, and information on their use and size.

When the Mauna Loa Observatory was established in 1956-57, little was known about how the earth's atmosphere and climate could be changed by mankind, how the sun's energy interacted with the atmosphere, how gases and aerosols moved around the globe, the effects of high altitude nuclear explosions on the atmosphere, or how particles and energy from space might affect or be affected by the upper levels of the atmosphere.

Over the years, atmospheric research and monitoring at Mauna Loa Observatory has grown and changed as new discoveries have led to insights about the atmosphere, and how it is being changed by both inputs from earth and from space. Some of the more dramatic results from Mauna Loa Observatory observations are that carbon dioxide, a powerful greenhouse gas, is steadily increasing in the atmosphere; that manmade CFCs, increasing in the atmosphere in the 1980s, were destroying the ozone layer; that international controls on CFCs have been very effective in reducing CFC concentrations with the result that the ozone layer is recovering; that energy and particles from the sun and space entering the earth's atmosphere are not constant; that pollution from Asia is affecting the air quality and amount of sunshine in the Hawaiian Islands; that gravity waves high in the atmosphere affect ozone concentrations above Hawaii which in turn can affect the amount of UV radiation reaching the surface; and that volcanic dust from large volcanic eruptions in the tropics dramatically affects the amount of sunlight in Hawaii.

EXHIBIT 8

The Mauna Loa Observatory carbon dioxide curve is now considered one of the most important geophysical records on earth. It started out as an experiment by a young researcher who had no idea carbon dioxide was increasing in the atmosphere due to man's burning of fossil fuels.

The three guiding principles of the research and monitoring operations at Mauna Loa Observatory are: 1) conduct high quality and cutting edge **science** projects over minimum temporary program time scales of not less than 5 years; 2)operate a **secure** facility to protect the many millions of taxpayer dollars invested in the site; and 3) operate a **safe** facility. In 49 years of continuous operation with up 12 people working on the mountain commuting from Hilo and Kona, Mauna Loa Observatory has not had a single staff injury requiring hospitalization.

Some questions arise recently with respect to the procedures NOAA should follow in installing new structures or improving structures at the Mauna Loa Observatory site. The Department of Commerce legal office and the National Oceanic and Atmospheric Administration Real Property Office were of the opinion that the Mauna Loa Observatory was on land granted to the United States Government in a set-aside and as such followed Federal Regulations in regard to the use of the land. As such, Federal land use and environmental regulations have been followed since the inception of the Mauna Loa Observatory in 1956. Recently, the DLNR has informed NOAA that in late 1964, new Hawaii land use regulations were enacted that supersede prior land use regulations and that Mauna Loa Observatory is not in compliance with current regulations.

In 1992, the DLNR inspected the Mauna Loa Observatory site and buildings in relation to a pending application for a subdivision of land to expand the Mauna Loa Observatory site by an additional 4 acres to construct a new atmospheric research building. During the inspection, the subsequent public notice period and the public hearing, no mention was made that the present or planned Mauna Loa facilities were not in compliance. This reinforced/confirmed the belief that Federal Regulations applied to past and future additions of structures to the site.

In an effort to become compliant in the most efficient and expedient manner (as it has never been the intent of the Mauna Loa Observatory to not comply with all Federal and State regulations) we respectfully request that the DLNR consider procedures to bring the observatory property into full compliance.

In closing I would like to note that MLO has a rigorous and lengthy process for allowing new instrumentation to be installed and operated at the site. Each proposed instrument/facility must provide new science for MLO, provide additional safety, or provide additional security. In the past 2 years, MLO has turned down a number of proposed projects that did not fulfill the above three criteria. One such rejected facility is the antenna array that has recently been constructed just below the Mauna Loa Observatory after receiving separate permission from DLNR. I expect two other projects of similar size, rejected by MLO, will be applying to the DLNR in the future for space on Mauna Loa Volcano.

Please do not hesitate to contact me for additional information as may be required.

Sincerely yours,

Russ Schnell (Dr.)
Director, NOAA Observatory and Global Network Operations

Attachment: Structures at Mauna Loa Observatory...

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Attachment 1. Structures at Mauna Loa Observatory, date of installation and use of the structure as an attachment to a letter to Samuel J. Lemmo, Administrator, OCCL, DLNR, February 15, 2006.

The following information is provided in regard to the items located on the land provided under EO 1720 and EO 3646. The three structures on land under EO 3646 are noted within the respective descriptions, all other structures are on EO 1720.

1. Construction prior to 1964 and unaltered to date.

- EPA Tower. Originally built in 1956 as a solar radiation deck adjacent to the original MLO main building. Solar radiation instruments were moved in 1997. EPA instruments were installed on this same tower in 2001. Deck footprint = 8' x 10' 3"; Stairs footprint = 12' 9" x 6' 8".

- AEC Building: Built by the Atomic Energy Commission in 1963 to monitor the effects of nuclear bomb tests on the atmosphere over Hawaii. Now used as a shelter for communication radios and as a visiting scientist building. Footprint = 16' x 26'.

- Butler Building: Constructed in 1958 for repairing instruments and the storage of tools. Footprint = 18' x14'.

- Storage shed started out as an electrical generator building in1956 and converted to storage of shipping containers later. Footprint = 20' x 12' 3".

- Outdoor toilets: Constructed in 1956. Footprint = 8' x 4' 1".

- Shop: Constructed in 1963. Now used for repairs. Footprint = 18'5" x 15' 4".

- Low meteorological tower: To support wind and temperature instruments. 1956. Footprint= 2' x 2'.

- NASA Sunphotometer Pad: Instruments look at dust and pollution in the air and sit on a concrete pad that dates from 1960. The sunphotometers are solar powered and are exchanged every few months after they are calibrated. Footprint = 12' x 14'.

- Solar radiation wall: North-South cinder block wall for mounting solar measuring instruments built in 1957. The UC Davis Samplers, collecting air pollution particles from Asia, were mounted on the top of the radiation wall in1983. Wall footprint = 28' x 1.5'.

- Rain Collector (GMD): First collector installed in 1957. Footprint = 3' x 1.5'.

- Radon/SO_2 building: Originally built in 1959 for photographing Atomic Energy Commission nuclear tests and called the "Camera Building". Later, instruments were

installed in the shelter to measure radon and SO_2. Footprint = 14' 2" x 12' 3". Slab for building = 15'2" x 17'.

- Solar Dome: Built in 1961 for solar radiation measurements. Footprint of slab = 17' 10" x 16' 8"

- Old CO_2 tower: Constructed in 1956. Footprint = 3' x 3'.

- Water Catchment Tank: Constructed in 1957. Footprint = 10' diameter.

- Slab of concrete between Army radio tower and AEC building with a pipe protruding from it. Of unknown age but thought to date from nuclear weapons test days in the late 1950s. Footprint = 5' x 6'.

- There are a few concrete pads scattered around the site that have no record of when they were constructed, but since they were before the time of one MLO staff member who worked 42 years at MLO, they must date from the early 1960s. One slab is located near the generator building with a footprint of 13.5' x 9.5'. Another is near the location of the former DOE tower and 6' x 3'. These pads are not used for anything at present.

- Old unused communication tower near generator building. Tower is 16 ' tall and is supported on a concrete slab of irregular shape of about 6' x 7'. The tower probably was installed in the early 1960s.

2. Constructed before 1964 and remodeled, modified or relocated after 1964.

- NCAR High Altitude Observatory: Observatory looks at the solar atmosphere and the effects of the sun on the earth's atmosphere and how this is changing over time. Constructed in 1964, instruments installed in 1965 and upgraded in 1991. Footprint = 47' x 16' 4"; additional instrument slab = 17'2" x 6.'

- Dobson Dome Shelter: This dome houses an instrument to measure ozone above Mauna Loa. The first shelter was installed in 1957. A newer dome cover was installed at the same location in 1973. Base footprint = 12' x 11' 9"

- Army radio transmitter building: Replaced an older structure dating from 1963 with a newer, more secure shipping container style structure set onto the same location in 2005. Footprint= 9' 10" x 19'10"

- Army Communications Tower: The original Atomic Energy Commission/military radio installation and antenna date from 1960. The present tower was upgraded in 2001 to better rebroadcast radio signals to the Pohakuloa Training Base and surrounding areas. The Army provides first response for medical emergencies on the Saddle Road and these communications pass through the MLO transponder to give

coverage from Kawaihae to Hilo. The Army also provides first responder medical service and security support for the Mauna Loa facility. The footprint of the concrete slab =13' 11" x 13' 7" with fence posts set in concrete next to the slab. A 4.5" cable conduit runs up to radios in the AEC Building.

- Rain Gauges: First installed at the MLO site in1956 and upgraded about 20 years ago. Footprint= a 3' x 3' concrete slab.

- Keeling Building: Original Mauna Loa building in use since constructed in 1956. Footprint of Keeling Building = 40' x 22' 5"; Water tank room (south-west corner) added in 1960 = 10'2" x 20' 5"; Flask storage room (north-west corner) added in 1994. Footprint = 16'2" x 10' 3". Storage space under walk-up deck added in 1964. Footprint = 13' x 8'.

- Communications structures: Original wooden building constructed in 1957 for radio communications from MLO to Hilo. This building was replaced with a concrete building in the early 1980s for Hawaiian Telephone communications. Footprint of the telephone building =12' x 9'4". Footprint of the concrete pad supporting a microwave antenna for the building = 4' x 4'.

- 120 ft. meteorological tower to support air sampling and meteorology above the surface. The original 90 ft tower, built in 1958, was replaced by a taller tower on the same site in 1986. Footprint of tower slab = 6' x 8'; Chain link security fence footprint= 12' 2" x 10' 2".

- GPS Antenna: Uses differential GPS to measure water vapor in the atmosphere and is mounted on a pole on the site dating from the1960s. The GPS antenna was installed in 2003 but does not have a footprint of its own. Antenna post is strapped to a 1" conduit that is not in use.

- Wind sock: This is a wind direction indicator attached to the top of a pole stuck in the lava to provide helicopters wind direction information should they require landing at the MLO site. The original pole probably went up in the 1960s at a site which is now on land provided under EO 3646. The actual cloth wind sock is replaced about every 10 years. The footprint of the concrete holding the pole upright is irregular and has a footprint = 5' x 5' irregular.

- USGS Tilt & Strain Well structures: An original lava/earthquake detector was installed at MLO in 1963. That sensor was replaced by a much better sensor at a new location in 2000 on land provided under EO 3646. The present instrument is used to detect surprise lava flows such as the one in 1984 that was flowing down the flank of Mauna Loa before it was visually noticed from the Saddle Road area. The 1984 flow reached within 4 miles of Hilo before stopping. Staff working at MLO inside buildings and at night might not know of a lava flow without this sensor. Solar panels power a radio to send an alert to the Hawaii Volcano Observatory when a lava flow

or earthquake is detected. Solar panel and transmitter = 16" diameter; antenna = 1' diameter; solar panels on poles on 2 slabs = 3' x 2'; wooden box on lava =3' x 3'.

3. Constructed After 1964

- Power transformer structures. Built in 1967 within a utility easement by HELCO to supply power to the observatory and updated in 1991. Footprints: Slab under transformer 3' x 4'; Slab next to transformer 9' x 1'10"; Chain link fence enclosure = 22'6" x 10'3".

- GONG Seatainer: Installed in 1994, the instrument looks at the temperature of the core of sun and the energy coming to earth from the sun. To understand climate change, we need to understand changes in the sun, as changes in the sun's energy amplify or hide climate change in the earth's atmosphere. GONG complements the NCAR HAO solar facility and is operated by NCAR staff. Container footprint = 20' x 8'; Concrete pedestal slab = 12' x 4'; instrument window slab = 12' x 4'; door slab = 3' x 2.5'; piers = 4.5' x 2.5'; storage building = 6' x 6'; fence enclosure = 15' x 24'.

- University of Massachusetts Microwave Ozone and NRL Water Vapor Building. 1995. Constructed to monitor ozone and water vapor concentrations in the stratosphere where ozone destruction is occurring. Footprint of building = 24' x12' on 12 piers; decks surrounding 3 sides of the building = 15' x 9'; 28' x 3'; 8' x 4'. Support legs for calibration tube = 2 sq. ft.

- Network for the Detection of Stratospheric Change (NDSC) Building and Radiation Deck, constructed in 1997. Footprint = 3500 sq ft.

- GROUNDWINDS: 2001. Measures wind in the atmosphere above Mauna Loa up to 60,000 ft. Winds above MLO are moving air pollution into and over Hawaii that affect MLO measurements. Footprint = 30' x 15'.

- AMIBA antenna and accessory structures: This is a temporary installation begun in 2005 to test a theory on particles from space. This high risk/high payoff test project will be terminated in 2008-09 and the sensors and infrastructure removed thereafter and the site rehabilitated. This is more of an astronomy project than an atmospheric science project although AMIBA does not study stars. This project but will produce valuable and unique information on aerosols and water vapor density and distributions above MLO as these affect the transmission of signals to the AMIBA instrument. The AMIBA structure was built in a borrow pit and caterpillar access road constructed when the MLO lava barrier was built in 1983. Footprint of the concrete pad for the antenna and Operations Seatainer = 80' x 56'; Footprint of driveway = 18' x 134'. This structure is on land transferred under EO 3646.

- Uchida and Chin Buildings. Originally called Keck-1 and -2 as these metal buildings were obtained from the Keck Observatory on Mauna Kea. They are 13 ft x 16 ft in

size. One will be used to store cylinders and sampling flasks, and one will be used for aerosol optical depth measurements. The foundations were poured in 2005 partially over existing concrete placed in the 1960s. The actual structures will be reassembled on the foundations in 2006, pending approval from DLNR. To date, only the foundations are in place. Footprint = 13' x 16' each, plus 4 piers of 1 sq. ft. each for the Uchida building. A request to construct these buildings is attached as a separate submission.

- AMIBA Staff Building. Built for an atmospheric experiment in 1995 and turned into a temporary office for the AMIBA project staff in 2002 after the original project was completed. Footprint of building = 24' x 12' supported on 12 piers.

- UNM Sampler: Collects air pollution particles in air traveling to Hawaii from Asia and is supported by 4 legs sitting on the lava. It was installed in 2004. Footprint= 3.5' x 1.5' on four legs.

- Webmet: Area where the meteorology measurements for the Web met system are representative. Sensors are on a moveable tripod that is moved as the met situation requires. Footprint = 3' diameter

- Allsky Area: Region where a camera looking at the sky is representative. No physical structure, just area where camera looks.

- Solar radiation deck. Part of the 3,500 sq. ft. NDSC building erected in 1997. Footprint of support pilings = 4 sq. ft. The radiation deck straddles the east end of the building and is 16' x 41' in size.

- UH VYSOS Instrument. The building was originally constructed in 1987 as the "Arizona Building" for a solar radiation project. A U of Hawaii, Hilo, instrument was mounted within the building in 2005 to look at early stellar evolution. To conduct this study, information on atmospheric extinction will be collected on a daily basis and provided at no cost to MLO as the light extinction from air pollution in the air a mile above MLO produces a strong error signal for the VYSOS instrument. Atmospheric extinction data is important for monitoring pollution aerosols flowing past the observatory in the upper atmosphere. Footprint = 11.5' diameter, wooden instrument cover extension = 5.5' x 2' 10".

- University of Denver FTIR: Extension of the Arizona Building constructed in1987. The University of Denver FTIR, which looks at chemicals in the atmosphere, was mounted in the building in 1991. Footprint = 14' x 14'.

- Climate Reference Network meteorological instruments were mounted in 2004 on a slab of unknown vintage but probably dating form the 1960s. Footprint of the slab = 12' x 8'. An adjoining concrete slab is 8' x 2' and has nothing on it.

- Solar panel slab. A slab of concrete of probable early 1960s vintage with a solar panel to operate the Climate Reference Network solar panel mounted in 2004. Footprint = 5' x 5'.

- Climate Reference Network rain bucket wind shield mounted on 12 legs sitting on the lava installed in 2004. Each leg is 0.2' in diameter and the whole ring has a diameter of 8'. The Rain gauge in the center of the ring has a footprint of 16" diameter.

- Test site near the Arizona building. Instruments sit on a concrete pad of unknown origin. Footprint of pad = 6' x 6'.

- National Weather Service Max/Min thermometer base. Dates form the early 1970s. Footprint = 2' x 2'.

- Base for future Navy Camera. Footprint = 8' x 8' on a pad of unknown age. The installation of a camera here is subject of a separate application sent along with this letter.

- Power distribution panel box near AEC building built in1986. Panel stands on 4 legs and casts a shadow of 4' x 2'.

- Rain Collector (EPA): Installed on a tripod in 2003. Footprint = 1 sq. ft.

- Security gate crossing the MLO road below the observatory. This gate was constructed in 2004-5 with permission from DLNR. Gate = 20' wide x 2" thick supported by 2 posts in concrete in the lava.

MAUNA LOA OBSERVATORY COMPLEX

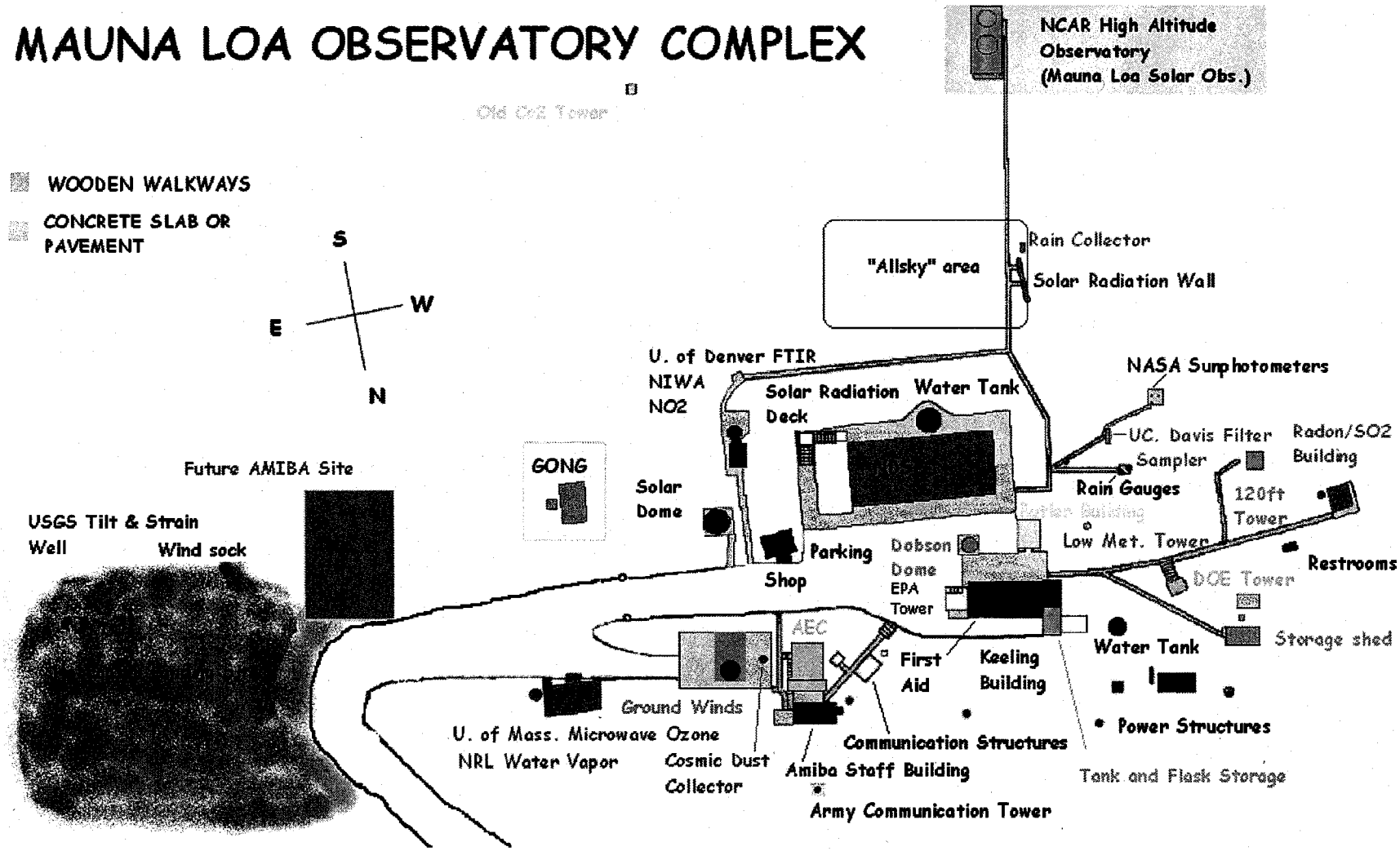

EXHIBIT 10